

ENGINEERING DESIGN FILE

Project/Task RWMC Subpit Sampling and Analysis

Subtask Pit 9 and Acid Pit Perimeter

EDF Page of

Subject : Results of Chemical and Radiological Analysis of the RWMC Pit 9 and Acid Pit Perimeter Subsurface Soil

Abstract:

This EDF summarizes the results of the November, 1990 sampling and analysis of the soils at the perimeter of the Acid Pit and Pit 9. Soil samples from 0 to 2 ft., mid-depth, and from the top of the underlying basalt (22 ft. max. depth) were collected for chemical and radiological analyses from 6 and 8 boreholes located around the perimeter of the Acid Pit and Pit 9, respectively. The results indicate only trace levels (ppb) of a few volatile organic compounds in some of the Acid Pit and Pit 9 perimeter locations, and only two locations around Pit 9 with above-background radiological levels. Based on these data, it appears that contaminant migration from the waste sources in these pits to these perimeter sampling locations has been extremely minor, and very localized.

Distribution (complete package)

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Author <i>R. M. Lopez</i>	Dept. <i>EEED</i>	Reviewed <i>Kerry P. Stea</i>	Date <i>JAN 9, 92</i>	Approved <i>[Signature]</i>	Date <i>1/9/92</i>
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RESULTS OF CHEMICAL AND RADIOLOGICAL ANALYSIS OF THE PIT 9 AND ACID PIT PERIMETER SOILS

1. INTRODUCTION

In November 1990, the Environmental Restoration Program undertook the sampling and analysis of subsurface soils around the perimeter of the Acid Pit and Pit 9 in the Subsurface Disposal Area (SDA) of the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering Laboratory (INEL).

The purpose of this activity was to collect data regarding the presence and movement of radioactive, organic, and inorganic contaminants in the sampling areas. The data will be used to guide further characterization studies, influence the evaluation of remedial measures, provide treatability information, and possibly for use in future risk assessments which will be performed on each of the pits.

This document reports on the activities and the results of sampling and analysis conducted around the perimeters of the Acid Pit and Pit 9. The work was conducted in accordance with Radioactive Waste Management Complex Sampling and Analysis Plan, EGG-WM-8934, Rev. 1

2. SITE DESCRIPTION

The SDA is a fenced area that comprises the western part of the RWMC. Included in the SDA are various, inactive and active pits, trenches, soil vault rows, and Pad A. The inactive pits are backfilled excavations with a variety of dimensions.

The Acid Pit is located near the center of the SDA and is approximately 197 ft by 104 ft. (See Figure 1.) When opened in 1954, this pit was believed to have been excavated to the top of underlying basalt and then backfilled with 1 to 2 ft of soil. A soil cover was reported to have been applied periodically over the waste. Official records indicated the pit was used for waste disposal from 1954 to 1961, but it is believed to have been used as late as the early 1970s. Closure of the Acid Pit included a final soil cover estimated to be 1 to 3 meters deep, a vegetative cover of crested wheatgrass, and monuments marking the pit corners.

Pit 9, operated from 1967 to 1969, is located in the northeast corner of the SDA and measures approximately 380 ft long by 125 ft wide. (See Figure 2). It is believed this pit was probably excavated to the top of the basalt and then backfilled with roughly 2 ft of soil. However, some of the waste in this pit may lie directly on the basalt. At closure, Pit 9 was backfilled with at least 3 ft of soil cover, a final cover of soil and vegetation was added, and boundary marking monuments were installed.

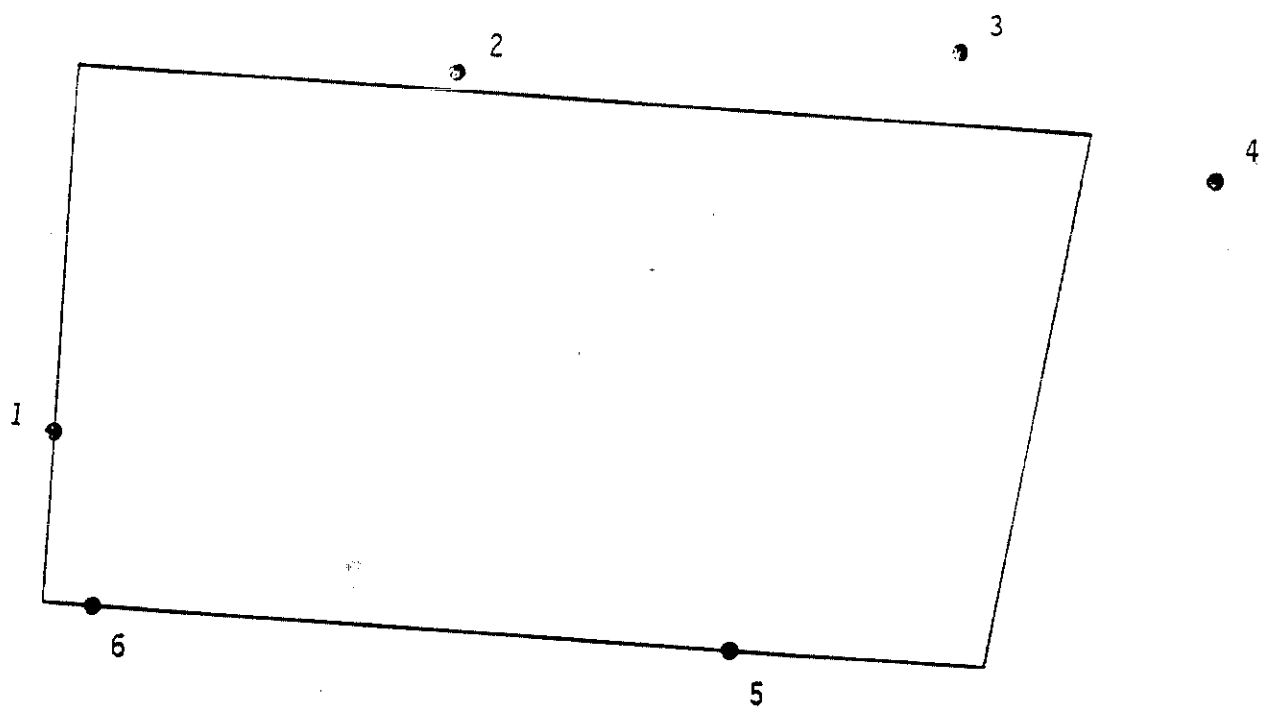


Figure 1. Acid Pit perimeter sampling locations (November, 1990)

● Perimeter Sampling locations

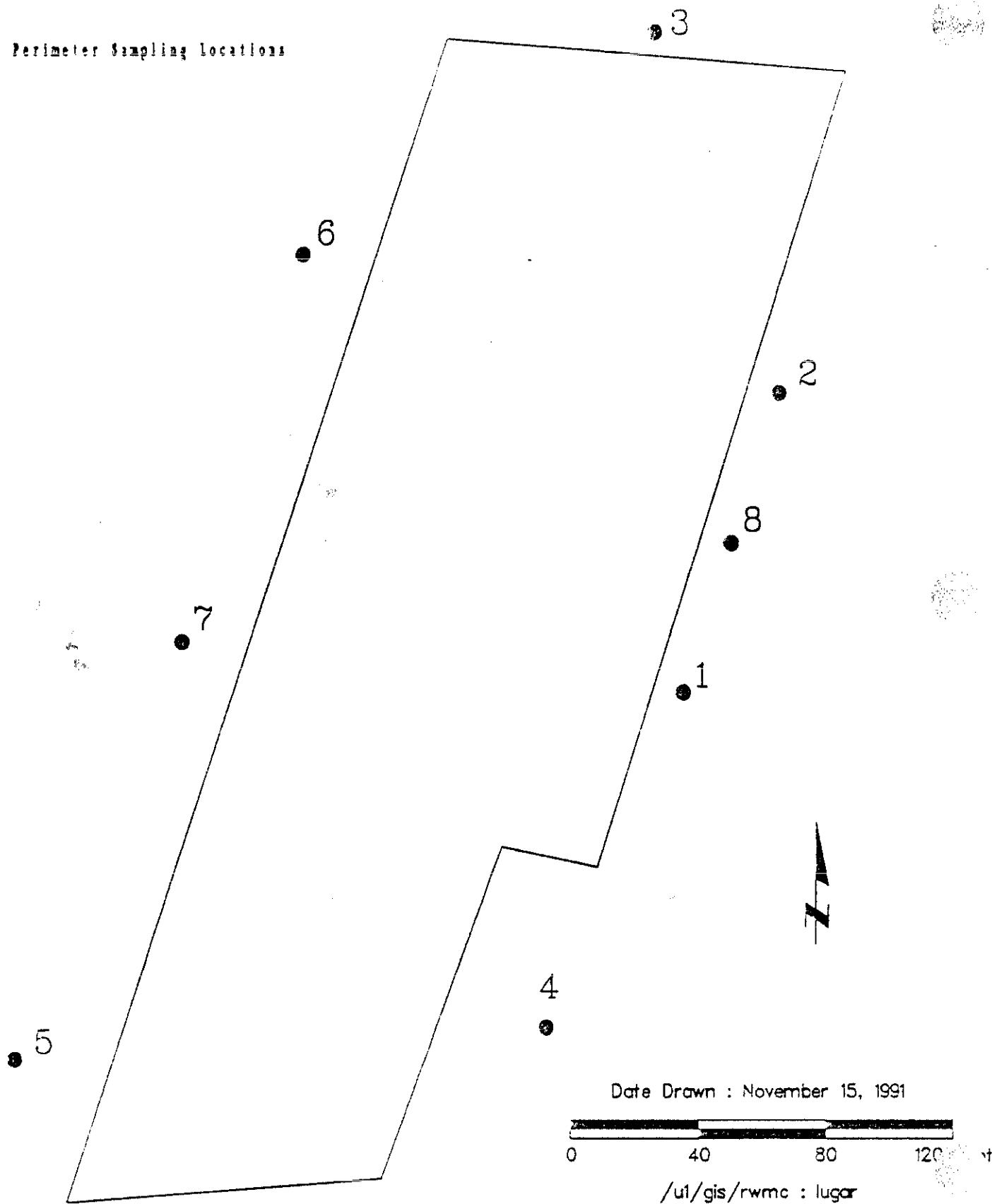


Figure 2. Pit 9 perimeter sampling locations (November, 1990)

3. SITE GEOLOGY

The SDA is underlain by soils, thin sedimentary layers and thick basalt deposits. The surficial sediment deposits at the SDA range in thickness from 1 foot to over 23 ft. The irregularities in the soil thicknesses generally reflect the surface of the underlying basalts. The depth to basalt predicted by seismic refraction survey and actual depths to basalt observed during perimeter drilling are presented in Table 1. A comparison of the predicted versus actual depths to basalt indicate that the seismic refraction technique was only marginally successful, with relative percent difference (RPD) ranging from 0 to 77%, with an average RPD of 18%. Generally, the surficial soils are shallow and consist of gravelly sand and fine-grained eolian deposits.

3.1 ACID PIT

The soil profiles recovered from the perimeter of the Acid Pit were of similar stratigraphy, generally grouped together as follows:

1. The top 7 to 8 ft is brown to light brown silt. Several samples contain roots and grass at the top, and a minor number of pebbles are usually scattered throughout this upper layer. Usually the upper foot of this unit is very dry and a slight amount of moisture occurs below it.
2. The second layer is a sandy unit that is black, brown, and white in color and extends to nearly 13 ft in most cases. This sand is medium to large grained and often contains small, slightly rounded pebbles that are approximately 1/8 to 1/16 inch in diameter. This unit is similar to the lower portion of the upper unit in that it contains a slight amount of moisture.
3. The third layer is silty clay that extends downward until it grades into a finer-grained clay unit that is typically only several in. thick. This layer is brown and slightly moist throughout its upper portion. The lowest 2 to 3 in. however is usually very moist.

Table 1. Predicted and actual depths to basalt

Location	Penetration No.	Predicted Depth (ft)	Actual Depth (ft)	Relative % Difference
<u>Acid Pit</u>				
	1	18.0	18.0	0.0
	2	17.0	18.8	5.7
	3	18.0	17.8	1.4
	4	18.0	19.5	8.0
	5	17.5	22.8	26.7
	6	18.6	18.9	2.2
<u>Pit 9</u>				
	1	21.2	22.0	3.7
	2	N/A ^a	16.9	N/A
	3	15.1	9.8	43.9
	4	17.7	18.0	1.7
	5	15.2	21.7	35.3
	6	17.5	7.7	77.6
	7	17.0	15.3	10.6
	8	N/A ^a	15.0	N/A
				<u>mean = 18.0</u>
<u>a. Sample location moved from original prediction</u>				

4. The underlying basalt surface around both Pits begins from 17 ft 6 in. to 22 ft 9 in. below land surface. A small amount of basalt was recovered and it is dark gray and vesicular.

3.2 PIT 9

The soil profiles recovered from the perimeter drilling of Pit 9 generally can be grouped together as follows:

1. The upper 4 to 6 ft is brown to light brown silt with some pebbles, grass, and roots in the top 6 in. of each hole. The top of this unit is very dry and there is a slight increase in moisture at approximately one foot below land surface.
2. The next layer is a black, brown, white, and tan sand unit that extends downward to an average of 10 to 10.5 ft. This layer often contains small (i.e., 1/8 to 1/16 in.), slightly rounded, red and yellow pebbles. This layer is also slightly moist.
3. The third layer is a silty to silty/sandy clay that is brown in color and slightly moist. This unit usually grades down into a finer grained and more compact clay that is several inches thick at most. This lower clay contains the most moisture of the entire hole.
4. The basalt, which is dark gray and vesicular, begins at the base of the compact clay.

4. DRILLING/SAMPLE COLLECTION

This project was conducted to determine potential contaminant migration from the Acid Pit and Pit 9. This was accomplished by coring six sample holes (penetrations) around the Acid Pit perimeter and eight holes around the perimeter of Pit 9 using sonic drilling techniques. Cores were collected continuously, with subsamples for radiological and chemical analyses collected from cores at 0-2 ft., mid depth, and at the top of the underlying basalt. The remaining core samples were capped, labelled, bagged, and archived.

Mobilization for drilling activities began on October 30, 1990. At this time test holes were completed in the Cold Test Pit area south of the SDA fence. After some minor adjustments to the drilling technique and equipment, the field team went through a dry run of the detailed operating procedure. Once completed, it was determined that the personnel were ready to begin drilling, and the sonic drilling process was ready to be used around the Acid Pit perimeter.

4.1 ACID PIT

On November 6, 1990 the first hole was drilled on the northern boundary of this pit. This penetration, Acid Pit Perimeter Hole #2, was chosen because coring this hole represented the least risk of encountering contamination based on geophysical and geologic information. Upon completion of this penetration, Penetration 3, 4, 5, 6 and 1 were drilled, respectively. All penetrations were subsequently completed with a capped fiberglass casing, open at the bottom of the hole, with a concrete surface pad and protective steel outer surface casing and locking cap. Each location is marked with a fluorescent orange flag that has been installed in the concrete surface pad and the locking caps have been marked with location, and hole number.

4.2 PIT 9

Pit 9 perimeter sampling began on November 15, 1990 with Penetration 3. The drilling sequence for these holes was based using the same logic as the Acid Pit. Therefore, the coring began on the north end of the pit with Penetration 3. The work proceeded north to south along the west side of Pit 9, with Penetrations 6, 7, and 5, respectively. The coring finished along the east side of the pit, moving south to north, with Penetrations 4, 1, 8, and 2 respectively. (See Figure 2). Pit 9 penetrations were subsequently completed with a capped fiberglass casing, open at the bottom of the hole, and a concrete surface pad with marker flag, and protective steel outer surface casing and locking cap.

5. ANALYTICAL METHOD AND RESULTS

5.1 ANALYTICAL METHODS

All samples were analyzed in accordance with the RWMC Subpit Sampling and Analysis Plan, EGG-WM-8934, Rev. 1 (EG&G Idaho, 1990). Chemical analyses were performed by the ERP-approved Weston Analytical Laboratory. The analyses were performed to analytical support Level III with CLP (Level IV) documentation and the data validated to ERP Level C per ERP SMO-SOP-12.11.

Radiological analyses were performed by the EG&G Idaho Radiological Measurements Laboratory (RML). The analytical methods used for analysis of samples from the perimeter borings around Pit 9 and the Acid Pit were the following:

- Volatile and Semi-volatile Organic Compounds and Pesticides/PCBs: U.S. EPA Contract Laboratory (CLP) Statement of Work (SOW) for Organic Analyses: Multimedia, Multi-concentration, 2/88.
- Metals and Cyanide: U.S. EPA CLP SOW for Inorganic Analyses: Multimedia, Multi-concentration SOW No. 788, including Rev. 2/89 and 6/89 and Tin by SW-846 Method 7870.
- Tributyl Phosphate (TBP): SW-846 Method 8270
- Total Petroleum Hydrocarbons (TPH): EPA Method 418.1 (Methods for Chemical Analyses of Water & Waste, EPA-600/4-79-020, March 1983.
- Ethylene Diamine Tetraacetic Acid (EDTA): Weston Laboratory Dionix method.
- Gamma-Ray Analyses: Gamma Ray Spectrometry by EG&G Idaho Radiation Measurements Laboratory, RML-3, DM-9, and DM-1.

In addition to these laboratory measurements, portable alpha, and beta-gamma radiation meters, a Jerome mercury vapor analyzer, and an HNU HW-101 photoionization detector (PID) organic vapor monitor (11.7 ev lamp) were used in the field for health and safety precautions and to provide field screening data.

5.2 ANALYTICAL RESULTS

Summary tables of the analytical results of the soil samples and field quality assurance samples are attached to this document (Tables 2 through 7). Figures 3 and 4 graphically present a summary of actual contaminants detected in the perimeter of the Acid Pit and Pit 9, respectively. The following section summaries these results for the Acid Pit and Pit 9.

5.2.1 Acid Pit

No radiological contaminants (above background), pesticides or PCBs were detected in any of the Acid Pit perimeter samples. For further details of the radiological analyses, see "RML Gamma-Ray Analyses of RWMC Subpit Sampling - Acid Pit for ERP 11/06/90-11/14/90," Internal Technical Report No. ST-PHY-91-005, dated March 1991, by T.C. Sorenson et al.

Volatile organic compounds (VOCs) detected in some samples included trace (ppb) levels of methylene chloride, acetone, chloroform, trichloroethylene (TCE), carbon tetrachloride, and toluene. Methylene chloride and acetone were detected at comparable concentrations in all samples, method blanks, and trip blanks. These two VOCs in particular are common analytical laboratory contaminants that often cross contaminate samples at trace levels, and this is a plausible explanation for the presence of these compounds in all samples.

The only reliable evidence of potential migration of VOCs from the Acid Pit is the low parts per billion levels of chloroform, carbon tetrachloride, and TCE in the deepest samples from Penetration #5. The detection of trace

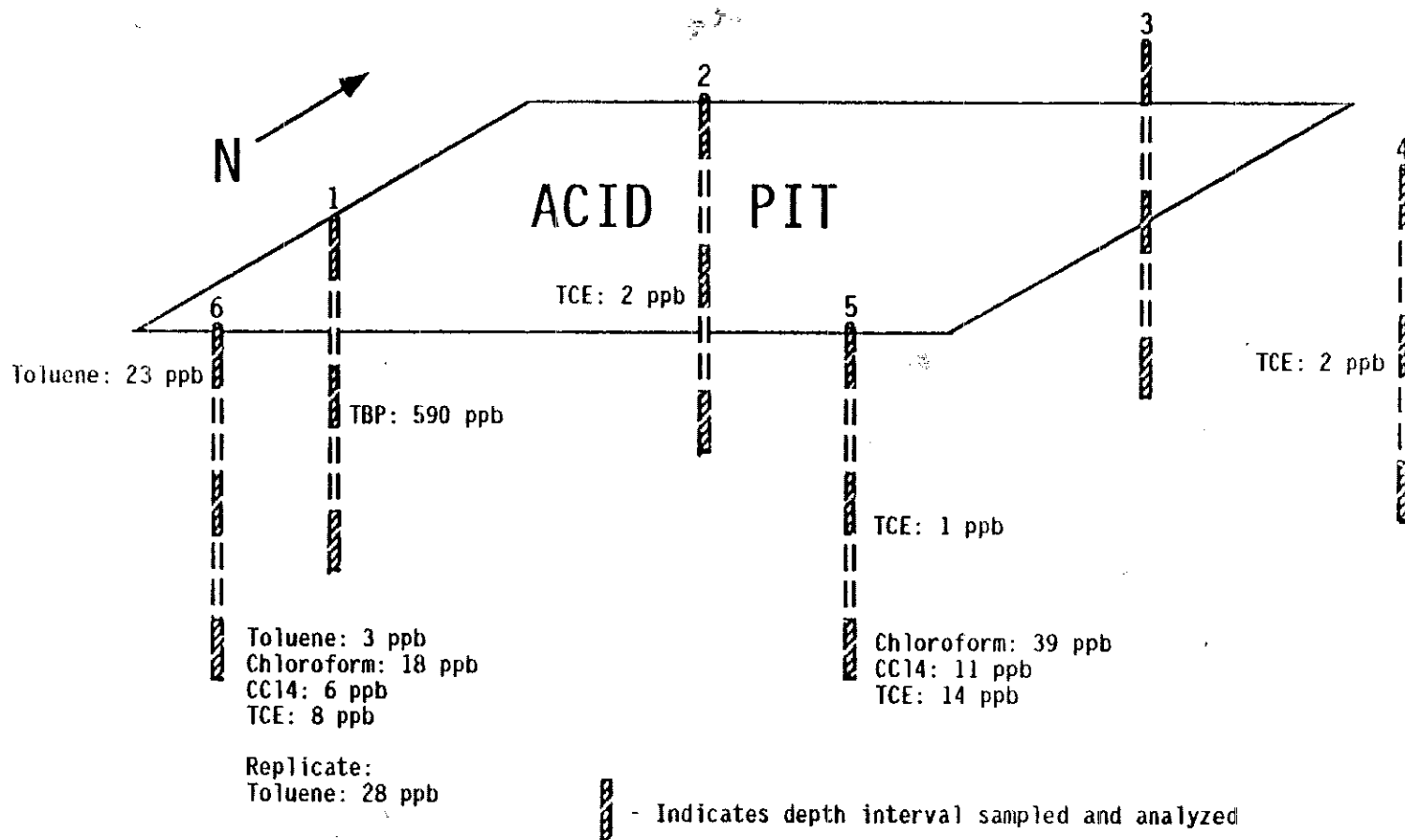


Figure 3. Contaminants Detected in Acid Pit Perimeter Soil Samples (November 1990)

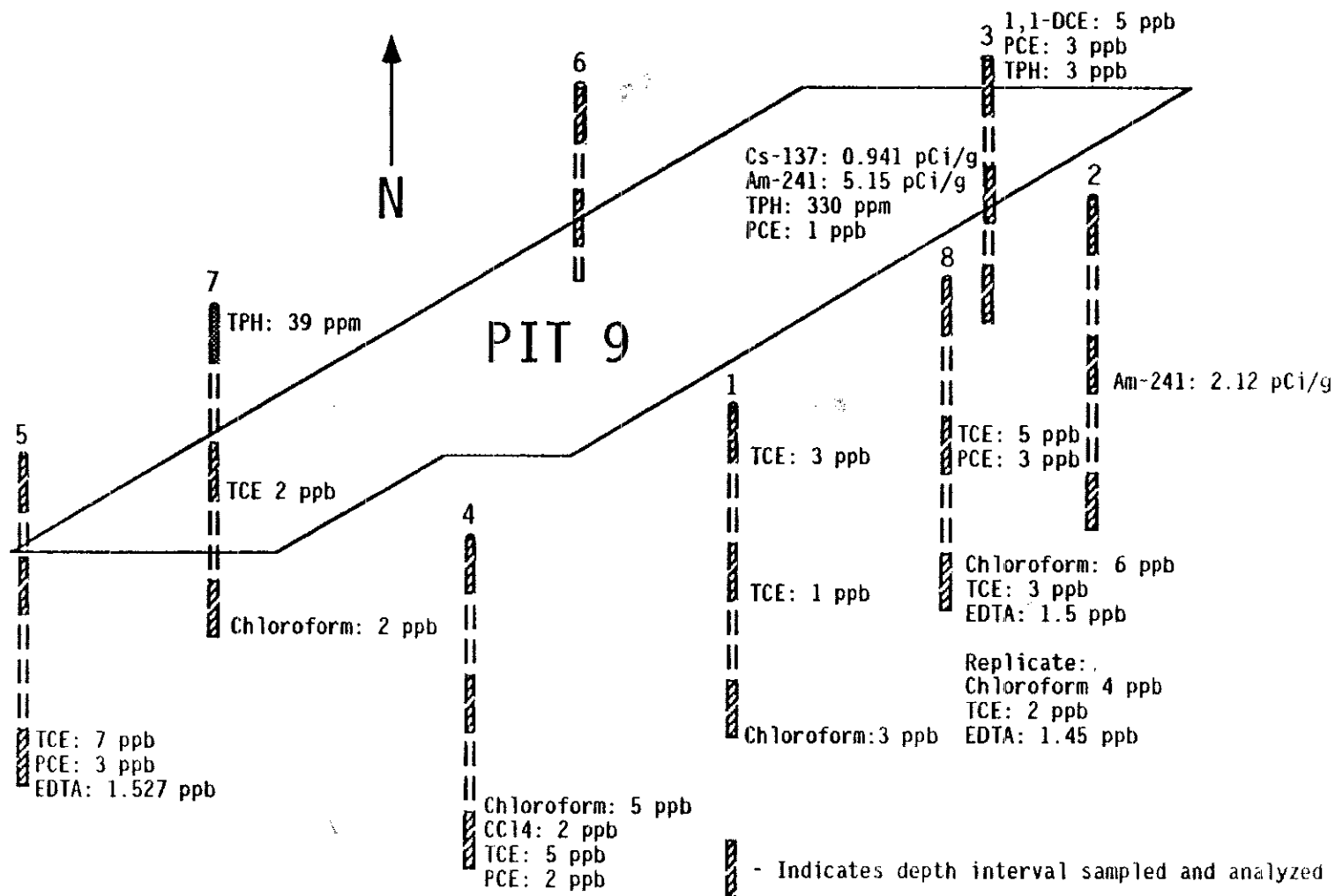


Figure 4. Contaminants Detected in Pit 9 Perimeter Soils (November, 1990)

levels of VOC contamination at the basalt-soil interface at the #5 location supports the theory that if migration of contaminants from the original Acid Pit has/is occurred/occurring, the most probable location to detect them is at the low point(s) in the underlying basalt and within the EM conductivity anomaly. The presence of trace levels of VOCs at the bottom of penetration #6, however, is not explained by this theory, but complicated due to questionable data quality for this location (See separate discussion of Penetration #6 later.)

Semivolatile compounds detected in some of the Acid Pit perimeter samples included: hexachlorobutadiene, Di-n-butylphthalate, butylbenzylphthalate, bis(2-Ethylhexyl)phthalate, and tributylphosphate (TBP) in concentrations ranging from parts per billion to low parts per million (ppm). However, given the ubiquitous nature of these semivolatile compounds, the random distribution, relatively low concentrations encountered, and lack of correlation to other contaminants, it is unlikely that any semivolatile contaminants are present in the Acid Pit perimeter soils.

Hexachlorobutadiene is a solvent for elastomers, heat transfer liquid, transformer and hydraulic fluid, and wash liquor for removing C₄ and higher hydrocarbons. Phthalate compounds are often ubiquitous in the field and laboratory environment. They are used typically as plasticizers or solvents in a variety of products, including paints, plastics, perfume, nail polish, safety glass, printing inks, paper coatings, and adhesives. Butylbenzylphthalate, in particular, is used as a plasticizer for polyvinyl and cellulosic resins. It is possible that any of the detected phthalate compounds originated from the lexan sample tube, plastic core catchers, sample handling (plastic container lids, labels, tape, etc.) or as analytical laboratory contaminants. Tributyl phosphate is used as a heat exchange medium, solvent extraction of metal ions from solution of reactor products, solvent for nitrocellulose, cellulose acetate, plasticizer, pigment grinding assistant, antifoam agent, and dielectric.

As expected, a variety of metals were detected in all the samples. Inter-hole comparison of the metals data, and comparison to INEL background soil data showed no evidence of any metals contamination (above background) in the Acid Pit perimeter soils. Interestingly, samples collected from the clay layer at the basalt-soil interface contained notably higher levels of calcium than found in the samples collected from the surface and mid-depth samples. This is likely explained by the sandy-silt composition of the mid-depth and surface samples, versus the clayey composition of the deeper samples as well as the possible leaching of calcium from the upper soil layers. Furthermore, calcium carbonates are often found on the surface of the underlying basalt.

All samples from all six locations were reported to contain total petroleum hydrocarbons (TPH) ranging from 2.6 to 17 mg/kg (ppm), including the method blanks at 2.9 and 4.0 mg/kg. The occurrence of blank contamination, lack of correlation to VOC and semivolatile data, and lack of any radiological contamination tends to disqualify this TPH data. Additional data validation to ERP Level B or A would help to confirm this preliminary assessment of the TPH data.

Ethylene diamine tetraacetic acid (EDTA) was analyzed for but not definitively detected in any of the Acid Pit perimeter samples. Blank contamination was noted for these results, and the actual detection limit could not be ascertained from this preliminary evaluation of the data.

The following sections briefly describe the type and concentration of the contaminants definitively detected in each of the six Acid Pit perimeter boreholes (penetrations). Specifically excluded from these discussions are methylene chloride, acetone, metals, TPH, and EDTA; as their results and possible sources have been discussed previously.

Acid Pit Perimeter Penetration #1:

The sample from the top of the underlying basalt detected chloroform at an estimated concentration of 2 $\mu\text{g/kg}$ (ppb). This concentration is at or below the detection limit. The only semi-volatile detected was tributyl

phosphate (TBP) at 590 $\mu\text{g/kg}$ at the mid depth (8-10 ft.). Due to the absence of any other radiological or chemical contaminants in this mid-depth sample, it is likely that the TBP is due to sample handling and/or analytical laboratory cross contamination. Note that this is the only Acid Pit perimeter sample where TBP was detected.

Acid Pit Perimeter Penetration #2:

The only VOC detected in this boring was 2 $\mu\text{g/kg}$ trichloroethylene (TCE) at the 8 to 10 ft. depth. This concentration is an estimated value at or below the detection limit. Di-n-butylphthalate and bis(2-Ethylhexyl)phthalate were detected at estimated concentrations ranging from 65 to 160 $\mu\text{g/kg}$ in all samples from this location, and the latter compound was also detected in sample blanks. These phthalates are attributed to cross contamination during sample handling or the analytical laboratory.

Acid Pit Perimeter Penetration #3:

No VOCs were detected in any of the samples from this location. Di-n-butylphthalate between 310 and 4700 $\mu\text{g/kg}$ was detected at all three depths, and is likely attributable to sample handling or analytical laboratory cross contamination.

Acid Pit Perimeter Penetration #4:

(TCE) was detected at the mid-depth at the estimated concentration of 2 $\mu\text{g/kg}$ (at or below the detection limit.) 2-Butanone (methyl ethyl ketone) was detected at the 19 to 19.5 ft. depth at the estimated concentration of 5 $\mu\text{g/kg}$ (at or below the detection limit.) Di-n-butylphthalate was detected in all three samples from this boring at 170 to 5900 $\mu\text{g/kg}$, and the 8 to 10 ft. deep sample contained an estimated 150 $\mu\text{g/kg}$ bis(2-Ethylhexyl)phthalate. The phthalates are most likely due to the sample handling and/or analytical laboratory contamination.

Acid Pit Perimeter Penetration #5:

Chloroform, carbon tetrachloride, and trichloroethylene were detected in the 22 to 22.5 ft. depth sample at 39 $\mu\text{g/kg}$, 11 $\mu\text{g/kg}$, and 14 $\mu\text{g/kg}$, respectively. This may indicate trace levels of contaminants have migrated to this location. TCE at an estimated concentration of 1 $\mu\text{g/kg}$ was reported for the mid-depth sample. Bis(2-Ethylhexyl)phthalate was detected at an estimated 120 $\mu\text{g/kg}$ in the surface sample and butylbenzylphthalate was detected in the mid-depth sample at an estimated 54 $\mu\text{g/kg}$. Both phthalates were also found in associated blanks, and are most likely due to the sample handling and/or analytical laboratory contamination.

Acid Pit Perimeter Penetration #6:

Toluene was detected at 23 $\mu\text{g/kg}$ in the surface (0 to 2 ft.) sample and may possibly be attributed to a surface deposited petroleum product such as oil, grease, gasoline or diesel fuel. Toluene was also estimated at 3 $\mu\text{g/kg}$ in one of two replicate samples from the 18 to 18.9 ft. interval along with chloroform, carbon tetrachloride, and trichloroethylene at 18 $\mu\text{g/kg}$, 6 $\mu\text{g/kg}$ and 8 $\mu\text{g/kg}$, respectively. Note that the associated replicate sample only reported detecting 28 $\mu\text{g/kg}$ toluene, and none of the other VOCs. This lack of qualitative agreement between replicate samples raises questions regarding data quality, analytical repeatability, and data useability for this sample's results.

5.2.2 Pit 9

Two man-made gamma-emitting radionuclides (Cs-137 and Am-241) were found to be true-positive detections in eight of the twenty four samples collected from the Pit 9 perimeter. Review of the data revealed that these true-positive detections were from the surface samples at Penetration #1, 3, 4, 5, 7, and 8, and the mid-depth samples at Penetration # 2, and 3. No radiological contamination was detected in any of the samples collected from the soil/basalt interface. The Cs-137 concentrations in these samples varied between .0825 (+/- 0.02) pCi/g to 0.941 (+/- 1.2) pCi/g. The Am-241 concentrations ranged from 0.121 (+/- 0.16) pCi/g to 5.15 (+/- 0.83) pCi/g.

The detection of these radionuclides primarily in the surface samples is not unexpected, they both exist in surface soils due to fallout from atmospheric nuclear weapons testing. Cs-137 and Am-241 is documented to exist in off-site Idaho surface soils at a geometric mean concentration of 0.81 pCi/g and 0.004 pCi/g respectively; and can typically vary by at least a factor of two.

Note that the mid-depth sample from Penetration # 3 demonstrated the highest Cs-137 and Am-241 concentrations of all samples; and at levels (particularly for Am-241) notably above surface background levels. The mid-depth sample from penetration #2 also demonstrated higher than surface background concentration of Am-241. Interestingly, the highest TPH value for all Pit 9 samples was also measured from the mid-depth sample from Penetration # 3; however no other contaminants were detected there. Due to the absence of any other chemical contaminants at these two locations, no definitive explanation for the Am-241 presence can be provided in this evaluation; however contaminant migration from the wastes in Pit 9 cannot be ruled out. For further details of the radiological analyses, see "RML Gamma-ray Analyses of RWMC Subpit Sampling - Acid Pit for ERP 11/06/90 - 11/14/90," Internal Technical Report No. ST-PHY-91-005, dated March 1991, by T.C.Sorenson et al.

The volatile organic compounds that were detected in trace (ppb) levels in twelve out of twenty four of the samples collected from the Pit 9 perimeter included methylene chloride, acetone, carbon disulfide, 1,1-Dichloroethene, chloroform, carbon tetrachloride, trichloroethylene (TCE), and tetrachloroethene.

Methylene chloride and acetone were detected in all samples and the blanks at comparable concentrations. Given that these two compounds are common analytical laboratory contaminants and the levels detected, it is unlikely that these two VOCs exist as true contaminants in the perimeter soils. The trace levels (ppb) of carbon disulfide, 1,1-Dichloroethene, chloroform, carbon tetrachloride, trichloroethene (TCE), and tetrachloroethene were at or below the detection limit and demonstrated no distribution trend, with the exception of the 16 to 18 ft. sample from Penetration #4. This

sample from the soil-basalt interface contained carbon disulfide, chloroform, carbon tetrachloride, trichloroethene, and tetrachloroethene. The presence of all these compounds, albeit at trace (ppb) levels at this location may indicate contaminant migration from Pit 9; however it is notable that no other radiological or chemical contaminants were detected at this location.

Semivolatile organic compounds were detected in sixteen of the twenty four samples from the Pit 9 perimeter. The semivolatile compounds detected include N-Nitrosodiphenylamine, Di-n-butylphthalate, bis(2-Ethylhexyl)phthalate, and tributyl phosphate (TBP) in concentrations ranging from parts per billion to low parts per million. However, given the ubiquitous nature of many of these semivolatile compounds, the random distribution, relatively low concentrations encountered, and lack of the presence of significant levels of other contaminants (namely VOCs), it is unlikely that any semivolatile contaminants have migrated to the Pit 9 perimeter soils.

None of the Pit 9 samples contained pesticides or PCBs. As expected, a variety of metals were detected in all the samples. Inter-hole comparison of the metals data, and comparison to INEL background soil data showed no evidence of any metals contamination (above background) in the Pit 9 perimeter soils. Calcium levels did not show the same trend (increasing concentration with depth) for the Pit 9 samples as did the Acid Pit samples.

All samples from all eight locations were reported to contain total petroleum hydrocarbons (TPH) ranging from 2.5 to 330 mg/kg (ppm), including the method blanks at 3.4 and 4.0 mg/kg. Only two samples exceeded 14 mg/kg (39 and 330 mg/kg), and may be true detections. The occurrence of blank contamination, lack of correlation to VOC and semivolatile data and lack of any radiological contamination tends to disqualify much of the TPH data for all but these two elevated samples. Additional data validation to ERP Level B or A would help to confirm this preliminary assessment of the TPH data.

Ethylene diamine tetraacetic acid (EDTA) was analyzed for but not definitively detected in any of the Pit 9 Perimeter samples. Blank

contamination was noted for these results, and the actual detection limit could not be ascertained from this preliminary evaluation of the data.

The following sections briefly describe the type and concentration of contaminants definitively detected in the Pit 9 perimeter samples. Specifically excluded are methylene chloride, acetone, metals, and EDTA; as their results and possible sources have been discussed previously.

Pit 9 Perimeter Penetration #1:

Carbon disulfide was detected in all three samples at or below the detection limit at an estimated level of $3 \mu\text{g/kg}$, and was also found in the blanks; thus it is unlikely that it exists as a contaminant in this location. Chloroform was detected at an estimated $3 \mu\text{g/kg}$ in the 20 to 22 ft. deep sample, and is at or below the detection limit. TCE was detected at or below the detection limit in the surface sample and mid-depth sample at 3 and 1 $\mu\text{g/kg}$.

The semivolatile compounds N-Nitrosodiphenylamine and Di-n-butylphthalate were detected in all three samples at comparable concentrations (46 to $58 \mu\text{g/kg}$). Due to this consistent distribution and the absence of any other radiological or chemical contaminants, it is likely that these phthalates are due to sample handling and/or analytical laboratory cross contamination.

Pit 9 Perimeter Penetration #2:

No volatile organic compounds were detected in any of the samples from this location. The only semivolatile compound detected was bis(2-ethylhexyl)phthalate at $60 \mu\text{g/kg}$ from the 0 to 2 ft. sample. A replicate sample collected at this location from 0 to 2 ft. showed comparable results. The mid-depth sample (8 to 10 ft. deep) demonstrated a notable Am-241 concentration of $2.12 (+/- 0.38) \text{ pCi/g}$, which is notably above a typical surface soil background concentration of 0.004 pCi/g .

Pit 9 Perimeter Penetration #3:

1,1-Dichloroethene at 5 $\mu\text{g/kg}$, tetrachloroethene at an estimated 3 $\mu\text{g/kg}$, and TPH at 14 mg/kg were detected in the 0 to 2 ft. interval at this location; Tetrachloroethene at an estimated 1 $\mu\text{g/kg}$ was found in the mid-depth sample. Due to the absence of any other radiological or chemical contaminants in this sample, it is likely that these VOCs are due to sample handling and/or analytical laboratory cross contamination. Bis(2-Ethylhexyl)phthalate was detected at 42 $\mu\text{g/kg}$ to 150 $\mu\text{g/kg}$ at the mid-depth and bottom samples. The phthalate is most likely due to the sample handling and/or analytical laboratory contamination.

The mid-depth sample (4 to 6 ft. deep) at this location exhibited notable Cs-137 and Am-241 levels of 0.941 (+/-0.12) pCi/g and 5.15 (+/- 0.83) pCi/g, respectively. In addition, a TPH value of 330 mg/kg was reported for the mid-depth sample. Curiously, no other VOC contamination was detected at this depth; however the elevated radiological values in combination with the elevated TPH value may be indicative of contaminant migration.

Pit 9 Perimeter Penetration #4:

Carbon disulfide was detected at or below the detection limit at an estimated value of 3 $\mu\text{g/kg}$ at all three depth intervals sampled, and is most likely a sample handling or analytical laboratory cross contaminant. Chloroform, carbon tetrachloride, TCE, and tetrachloroethene were detected at trace (ppb) levels in the 16 to 18 ft. depth interval sample. The levels of these four VOCs was at or below the detection limit and are estimated values; however the presence of all four compounds at this depth may indicate trace levels of migrated contaminants. The only semivolatile compound detected at the 16 to 18 ft. location was Di-n-butylphthalate at an estimated concentration of 51 $\mu\text{g/kg}$, and is most likely a sample handling or analytical laboratory cross contaminant.

Pit 9 Perimeter Penetration #5:

The only VOCs detected in this boring were at the bottom (20 to 20.8 ft.) and consisted of TCE at 7 $\mu\text{g}/\text{kg}$ and tetrachloroethene at (estimated) 3 $\mu\text{g}/\text{kg}$, and may indicate trace levels of migrated contaminants. Bis(2-Ethylhexyl)phthalate was detected in all three samples (100 to 3500 $\mu\text{g}/\text{kg}$) and is most likely a cross contaminant from sample handling or the analytical laboratory. EDTA was reported at just above the detection limit at 1.527 $\mu\text{g}/\text{mg}$ from the 20 to 20.8 ft. sample.

Pit 9 Perimeter Penetration #6:

Only two samples were analyzed from this boring (0-2 ft, and 4-6 ft.), as the basalt was encountered much sooner than anticipated, i.e. 7.7 feet versus 17.5 feet. No VOCs were detected at this boring, and bis(2-ethylhexyl)phthalate was detected on both samples at 1800 and 2000 $\mu\text{g}/\text{kg}$, respectively. The phthalate is most likely due to cross contamination of the sample during sample handling or at the analytical laboratory.

Pit 9 Perimeter Penetration #7:

TCE (estimated 2 $\mu\text{g}/\text{kg}$) was detected in the 8 to 10 ft. sample, and chloroform was detected in the 14 to 15.4 ft. deep sample. Both are estimated values at or near the detection limit. Bis(2-Ethylhexyl)phthalate was detected at 370 to 1100 $\mu\text{g}/\text{kg}$ in all samples from this boring, and Di-n-butylphthalate was detected in the deepest sample at 480 $\mu\text{g}/\text{kg}$. These phthalates are most likely cross contaminants from sample handling or the analytical laboratory. A TPH value of 39 mg/kg for the 0 to 2 ft. sample was reported, and may possibly be attributed to a surface deposition of a petroleum product (oil, grease, gasoline, diesel, etc.).

Pit 9 Perimeter Penetration #8:

No VOCs were detected in the top 0 to 2 ft. sample. TCE and tetrachloroethene was detected in the 8 to 10 ft. sample at 5 $\mu\text{g/kg}$ and an estimated 3 $\mu\text{g/kg}$, respectively. The deepest sample (14 to 15 ft.) exhibited chloroform and TCE at 6 $\mu\text{g/kg}$ and estimated 3 $\mu\text{g/kg}$, respectively. EDTA was also detected at just above the detection limit at 1.5 $\mu\text{g/kg}$. A replicate sample from this depth demonstrated good precision with the detection of chloroform, TCE, and EDTA at an estimated 4 $\mu\text{g/kg}$, 2 $\mu\text{g/kg}$, and 1.448 $\mu\text{g/kg}$, respectively.

5.2.3 Field Quality Assurance Sample Results

Trip blanks (40 ml vials of water supplied by Weston Analytical Lab) were shipped in each cooler with the soil samples to the analytical laboratory for volatile organic analysis. The results indicated the presence of methylene chloride (3 to 20 $\mu\text{g/L}$) and acetone (5 to 15 $\mu\text{g/L}$) in nearly all trip blanks, and carbon disulfide at 3 $\mu\text{g/L}$ in two trip blanks. These compounds were also detected in the laboratory method blanks and are most likely due to laboratory cross contamination. Based on these results, no contamination of the samples during shipping and handling is believed to have occurred. Trip blank results can be found on Table 2B.

Equipment rinsates (HPLC-grade water) were collected from precleaned or decontaminated equipment (final rinse) for volatile organic, metals, and gamma-ray analyses. No radionuclides above background were detected in any of the rinsate samples. The results indicated the presence of methylene chloride (2 to 17 $\mu\text{g/L}$) and acetone (8 to 69 $\mu\text{g/L}$) in all rinsate samples; and carbon disulfide at 3 $\mu\text{g/L}$ in one sample. These compounds were also detected in the laboratory method blanks and are most likely due to laboratory cross contamination. Chloroform was detected at 7 to 9 $\mu\text{g/L}$ in all rinsate samples and is most likely attributable as a contaminant of the HPLC-grade water used to make-up the rinsate samples, or as a contaminant of the pesticide grade methanol used in the decontamination operation. The impact of these trace levels of chloroform detected in the rinsate samples on the soils data quality/useability is negligible. Trace levels of chloroform detected in a given soil sample could be attributed to residual chloroform remaining on the

sampling equipment after decontamination; however due to the dilution effect of the soil sample volume, it is unlikely this is a realistic source of the chloroform detected in the soil samples collected for this project. The metals analyses of the rinsate samples demonstrated no evidence of notable metals contamination that could impact the data quality/useability of the soils metal data. Rinsate results can be found on Tables 2A and 4A.

5.2.4 Field Measurements versus Laboratory Results

Radiological: All radiological monitoring devices used in the field to support this sampling activity worked satisfactorily and as expected. The above background activity detected by the RML in two samples from the Pit 9 perimeter was not detected by the field instruments due to the very low level of radioactivity and the much greater sensitivity (detection limit) of the RML laboratory instrumentation.

Mercury: There was no observed correlation between mercury vapor concentrations measured using a portable instrument (Jerome mercury vapor analyzer) at the borehole and mercury levels in the recovered soil samples. In fact, all of the soil samples contained less than the detection limit (approximately 0.2 mg/kg) mercury. Possible explanations for the mercury vapor levels (ranging from 0 to 0.60 mg/m³) at the borehole include: mercury vapors in the diesel exhaust of the drill rig, interferences from non-mercury compounds or dust, humidity/temperature effects on the portable analyzer, or a malfunctioning instrument.

Organic Vapor Monitor: There was no definitive correlation between the organic vapor measurements made from the inside of the lexan sample tube prior to soil removal for containerizing and the analytical laboratory VOC results. A portable photoionization detector (Hnu Systems Inc. PI-101) was used to make these organic vapor measurements. The PI-101 detected total organic vapor concentrations ranging from 0 to 36 ppm in the core headspace; however the laboratory VOC analysis of the soil detected only trace levels (ppb) of VOCs in some of the samples. Correlation of field measurements and laboratory

results was poor. The elevated PI-101 field readings are possibly attributed to interference from high humidity (the inside surface of the clear lexan cores were often clouded with condensed moisture), the lexan core, or due to instrument malfunction. Loss of volatiles from the sample due to the drilling technique and sample handling may also explain this discrepancy. However, rapid containerizing of the sample material from the core (with minimal disturbance), as well as adherence to preservation and holding time requirements tend to disqualify this argument.

6. CONCLUSIONS

The sampling and analysis of the perimeter of Pit 9 and the Acid Pit successfully met the project's objectives. Additionally, the sonic drill rig equipment and associated coring methods proved that subsurface soil samples can be obtained using this technique without the generation of drill cuttings, without the introduction of drilling fluids, and minimal rotation of the drill bit.

Based on analytical data validated to ERP Level C, no significant (health or environment-threatening) levels or distribution of radiological or chemical contamination were detected around either the Acid Pit or Pit 9. However, trace levels of volatile organic compounds detected at sporadic locations at both pits, and Cs-137 and Am-241 levels above background measured at two Pit 9 sampling locations indicate possible migration of these contaminants from the pits or other nearby disposal locations, (pits, trenches, etc.) albeit at trace amounts and very localized.

At the Acid Pit perimeter, the samples from the soil-basalt interface (22.0 to 22.8 ft. deep) at Penetration # 5 contained the most reliable evidence of potential migration: the presence of chloroform, carbon tetrachloride, and TCE. These three compounds were detected well above the detection limit and have been previously observed in the subsurface soil vapor at the SDA (EG&G Idaho, Draft RI/FS Study Work Plan of the SDA, RWMC at the INEL, EGG-WM-8776, December, 1989). The same three compounds were also detected in one of two (replicate) samples from the soil-basalt interface at Penetration #6 with a remarkably similar ratio of concentrations; however the replicate sample did not demonstrate suitable qualitative and quantitative precision for the results from this sample to be reliable.

At the Pit 9 perimeter, the presence of above background levels of Cs-137 and Am-241 at the mid-depth (4 to 6 ft.) location as well as the elevated TPH concentration may be indicative of contaminant migration, although it is puzzling that no significant levels of VOCs were detected at this location.

The presence of trace (ppb) levels of chlorinated hydrocarbons (carbon tetrachloride, TCE, chloroform, and tetrachloroethene) at the mid-depth or soil-basalt interface at six borings may indicate trace VOC migration, albeit at very trace amounts and very localized.

No man-made radionuclides were detected in any of the Acid Pit perimeter samples; however many of the Pit 9 perimeter surface (0 to 2 ft.) samples did contain background levels of Cs-137 and Am-241. Regrading and recontouring, past flooding of the SDA and Pit 9, as well as possible different source locations/depths of the soil cover on these pits may explain this inconsistency.

The usefulness of the mercury vapor analyzer and organic vapor monitor as field screening devices for this sampling effort was questionable due to a lack of correlation to sample results (apparent false positives), and suspected interferences or instrument malfunction. The radiological field measurements during this effort were adequate and the data did not reveal any limitations or deficiencies.

ATTACHMENT

Table 2 through Table 6 Data Flag Definitions

The following data flags are used as qualifiers to the analytical results presented in Table 2 through Table 6.

<u>Data Flag</u>	<u>Table</u>	<u>Definition</u>
B	2,2A,2B, 3,5,6	Indicates contaminant was detected in the method blank.
B	4	Indicates value is less than contract required detection limit but greater than the instrument detection limit.
J	2,2A,2B, 3,5,6	Indicates an estimated value. This flag is used cases where a target analyte is detected at a level less than the lower quantification level. If the limit of quantification is 10 mg/L and a concentration of 3 mg/L is calculated, it is reported as 3 J.
U	4,5,6	Compound was analyzed for but not detected. The detection limit for the sample (not method detection limit) is reported with U (e.g., 10 U).
N	4	Spike sample recovery not within control limit.
E	4	Value is estimated because of the presence of interference.
S	4	Value was determined by the method of standard additions.
NR	5	Not reported.
*	4	Duplicate analysis not within control limits.

TABLE 2. RUMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC DATA

Page 1 of 7

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.
LOCATION	PENETRATION 001	PENETRATION 001	PENETRATION 001	PENETRATION 002	PENETRATION 002	PENETRATION 002	PENETRATION 002
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9001010E	E9002010E	E9003010E	E9005010E	E9005010ERE	E9006010E	E9007010E
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9012L846	9012L846	9012L846	9011L786	9011L786	9011L786	9011L786
FIELD MEASUREMENTS							
Depth (ft)	0-2	8-10	20-22	0-2	0-2	8-10	16-16.9
TARGET COMPOUNDS							
Methylene Chloride	22 B	22 B	22 B	39 B	46 B	44 B	53 B
Acetone	22	19	17	16 B	16 B	14 B	18 B
Carbon Disulfide	3 JB	3 JB	3 JB	---	---	---	---
1,1-Dichloroethene	---	---	---	---	---	---	---
Chloroform	---	---	3 J	---	---	---	---
2-Butanone	---	---	---	---	---	---	---
Carbon Tetrachloride	---	---	---	---	---	---	---
Trichloroethene	3 J	1 J	---	---	---	---	---
Tetrachloroethene	---	---	---	---	---	---	---
Toluene	---	---	---	---	---	---	---
Dilution Factor	0.980	1.000	1.000	1.000	1.000	1.000	1.000
Total (Allowed) Hold Time	9(14)d	9(14)d	9(14)d	7(14)d	7(14)d	7(14)d	7(14)d

TABLE 2. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC DATA (Continued)

Page 2 of 7

AREA LOCATION	SDA PIT 9 EXT. PENETRATION 003	SDA PIT 9 EXT. PENETRATION 003	SDA PIT 9 EXT. PENETRATION 003	SDA PIT 9 EXT. PENETRATION 004	SDA PIT 9 EXT. PENETRATION 004	SDA PIT 9 EXT. PENETRATION 004	SDA PIT 9 EXT. PENETRATION 005
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9009010E	E9010010E	E9011010E	E9013010E	E9014010E	E9015010E	E9017010E
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L701	9011L701	9011L701	9012L846	9012L846	9012L846	9011L750
FIELD MEASUREMENTS							
Depth (ft)	0-2	4-6	8-9.9	0-2	8-10	16-18	0-2
TARGET COMPOUNDS							
Methylene Chloride	34 B	57 B	40 B	18 B	27 B	31 B	40 B
Acetone	8 JB	24 B	14 B	11 B	25	32	20 B
Carbon Disulfide	---	---	---	3 JB	3 JB	3 JB	---
1,1-Dichloroethene	5	---	---	---	---	---	---
Chloroform	---	---	---	---	---	5 J	---
2-Butanone	---	---	---	---	---	---	---
Carbon Tetrachloride	---	---	---	---	---	2 J	---
Trichloroethene	---	---	---	---	---	5 J	---
Tetrachloroethene	3 J	1 J	---	---	---	2 J	---
Toluene	---	---	---	---	---	---	---
Dilution Factor	1.000	1.000	1.000	1.020	1.000	1.020	1.000
Total (Allowed) Hold Time	10(14)d	10(14)d	10(14)d	11(14)d	8(14)d	8(14)d	7(14)d

TABLE 2. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC DATA (Continued)

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.
LOCATION	PENETRATION 005	PENETRATION 005	PENETRATION 006	PENETRATION 006	PENETRATION 007	PENETRATION 007	PENETRATION 007
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9018010E	E9019010E	E9021010E	E9023010E	E9025010E	E9026010E	E9027010E
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L750	9011L750	9011L750	9011L750	9011L750	9011L750	9011L750
FIELD MEASUREMENTS							
Depth (ft)	6-8	20-20.8	0-2	4-6	0-2	8-10	14-15.4
TARGET COMPOUNDS							
Methylene Chloride	35 B	41 B	50 B	52 B	49 B	35 B	47 B
Acetone	32 B	47 B	27 B	47 B	42 B	41 B	26 B
Carbon Disulfide	---	---	---	---	---	---	---
1,1-Dichloroethene	---	---	---	---	---	---	---
Chloroform	---	---	---	---	---	---	2 J
2-Butanone	---	---	---	---	---	---	---
Carbon Tetrachloride	---	---	---	---	---	---	---
Trichloroethene	---	7	---	---	---	2 J	---
Tetrachloroethene	---	3 J	---	---	---	---	---
Toluene	---	---	---	---	---	---	---
Dilution Factor	1.000	1.000	1.040	1.000	1.000	1.000	1.000
Total (Allowed) Hold Time	7(14)d	7(14)d	10(14)d	11(14)d	10(14)d	9(14)d	9(14)d

TABLE 2. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC DATA (Continued)

Page 4 of 7

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	PENETRATION 008	PENETRATION 008	PENETRATION 008	PENETRATION 008	PENETRATION 001	PENETRATION 001	PENETRATION 001
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9029010E	E9030010E	E9031010E	E9031020E	P9001010E	P9002010E	P9003010E
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L786	9011L786	9011L786	9011L786	9011L702	9011L702	9011L702
FIELD MEASUREMENTS							
Depth (ft)	0-2	8-10	14-15	14-15	0-2	8-10	16-18
TARGET COMPOUNDS							
Methylene Chloride	57 B	39 B	48 B	48 B	36 B	29 B	49 B
Acetone	16 B	14 B	12 B	20 B	26 B	27 B	60 B
Carbon Disulfide	---	---	---	---	---	---	---
1,1-Dichloroethene	---	---	---	---	---	---	---
Chloroform	---	---	6	4 J	---	---	2 J
2-Butanone	---	---	---	---	---	---	---
Carbon Tetrachloride	---	---	---	---	---	---	---
Trichloroethene	---	5	3 J	2 J	---	---	---
Tetrachloroethene	---	3 J	---	---	---	---	---
Toluene	---	---	---	---	---	---	---
Dilution Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total (Allowed) Hold Time	6(14)d	6(14)d	6(14)d	6(14)d	9(14)d	7(14)d	7(14)d

TABLE 2. RUMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC DATA (Continued)

AREA	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	PENETRATION 002	PENETRATION 002	PENETRATION 002	PENETRATION 003	PENETRATION 003	PENETRATION 003	PENETRATION 004
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P9005010E	P9006010E	P9007010E	P9009010E	P9010010E	P9011010E	P9013010E
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L548	9011L548	9011L548	9011L563	9011L563	9011L563	9011L563
FIELD MEASUREMENTS							
Depth (ft)	0-2	8-10	16-18	0-2	8-10	16-17.8	0-2
TARGET COMPOUNDS							
Methylene Chloride	58 B	35 B	54 B	33 B	29 B	34 B	35 B
Acetone	41 B	27 B	59 B	54 B	34 B	46 B	53 B
Carbon Disulfide	---	---	---	---	---	---	---
1,1-Dichloroethene	---	---	---	---	---	---	---
Chloroform	---	---	---	---	---	---	---
2-Butanone	---	---	---	---	---	---	---
Carbon Tetrachloride	---	---	---	---	---	---	---
Trichloroethene	---	2 J	---	---	---	---	---
Tetrachloroethene	---	---	---	---	---	---	---
Toluene	---	---	---	---	---	---	---
Dilution Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total (Allowed) Hold Time	11(14)d	11(14)d	11(14)d	10(14)d	10(14)d	10(14)d	9(14)d

TABLE 2. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC DATA (Continued)

Page 6 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	ACID PIT EXT. PENETRATION 004 UNDERBURDEN P9014010E SUBSURFACE S ug/kg 9011L563	ACID PIT EXT. PENETRATION 004 UNDERBURDEN P9015010E SUBSURFACE S ug/kg 9011L563	ACID PIT EXT. PENETRATION 005 UNDERBURDEN P9017010E SUBSURFACE S ug/kg 9011L625	ACID PIT EXT. PENETRATION 005 UNDERBURDEN P9018010E SUBSURFACE S ug/kg 9011L625	ACID PIT EXT. PENETRATION 005 UNDERBURDEN P9019010E SUBSURFACE S ug/kg 9011L625	ACID PIT EXT. PENETRATION 006 UNDERBURDEN P9021010E SUBSURFACE S ug/kg 9011L676	ACID PIT EXT. PENETRATION 006 UNDERBURDEN P9022010E SUBSURFACE S ug/kg 9011L676
<u>FIELD MEASUREMENTS</u>							
Depth (ft)	8-10	19-19.5	0-2	8-10	22-22.8	0-2	8-10
<u>TARGET COMPOUNDS</u>							
Methylene Chloride	42 B	39 B	110 B	98 B	92 B	33 B	31 B
Acetone	49 B	80 B	10 B	20 B	18 B	21 B	39 B
Carbon Disulfide	---	---	---	---	---	---	---
1,1-Dichloroethene	---	---	---	---	---	---	---
Chloroform	---	---	---	---	39	---	---
2-Butanone	---	5 J	---	---	---	---	---
Carbon Tetrachloride	---	---	---	---	11	---	---
Trichloroethene	2 J	---	---	1 J	14	---	---
Tetrachloroethene	---	---	---	---	---	---	---
Toluene	---	---	---	---	---	23	---
Dilution Factor	1.000	1.000	1.000	1.020	1.020	1.000	1.000
Total (Allowed) Hold Time	9(14)d	9(14)d	8(14)d	8(14)d	8(14)d	8(14)d	8(14)d

TABLE 2. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC DATA (Continued)

Page 7 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	ACID PIT EXT. PENETRATION 006 UNDERBURDEN P9023010E SUBSURFACE S ug/kg 9011L676	ACID PIT EXT. PENETRATION 006 UNDERBURDEN P9023020E SUBSURFACE S ug/kg 9011L676
<u>FIELD MEASUREMENTS</u>		
Depth (ft)	18-18.9	18-18.9
<u>TARGET COMPOUNDS</u>		
Methylene Chloride	33 B	40 B
Acetone	34 B	37 B
Carbon Disulfide	---	---
1,1-Dichloroethene	---	---
Chloroform	18	---
2-Butanone	---	---
Carbon Tetrachloride	6	---
Trichloroethene	8	---
Tetrachloroethene	---	---
Toluene	3 J	28
Dilution Factor	1.000	1.040
Total (Allowed) Hold Time	8(14)d	8(14)d

TABLE 2A. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC RINSATE DATA

Page 1 of 1

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	QC	QC	QC	QC	QC
TYPE OF LOCATION	RINSATE	RINSATE	RINSATE	RINSATE	RINSATE
SAMPLE NUMBER	E9033010E	E9034010E	P9025010V	P9025010V	P9026010E
MEDIA	WATER	WATER	WATER	WATER	WATER
UNITS	ug/L	ug/L	ug/L	ug/L	ug/L
SDG NUMBER	9012L846	9011L750	9011L702	9011L563	9011L702
TARGET COMPOUNDS					
Methylene Chloride	4 JB	17 B	2 JB	2 JB	2 JB
Acetone	8 J	11 B	54 B	54 B	69
Carbon Disulfide	---	3 JB	---	---	---
Chloroform	8	8	9	9	7
Dilution Factor	1.000	1.000	1.000	1.000	1.000
Total (Allowed) Hold Time	14(14)d	11(14)d	6(14)d	6(14)d	7(14)d

TABLE 2B. RMMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC TRIP BLANK DATA

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	QC	QC	QC	QC	QC	QC	QC
TYPE OF LOCATION	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK
SAMPLE NUMBER	E9035010V	E9036010E	E9037010E	E9038010E	P9027010V	P9028010E	P9029010E
MEDIA	WATER	WATER	WATER	WATER	WATER	WATER	WATER
UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SDG NUMBER	9011L750	9011L701	9011L786	9012L846	9011L563	9011L548	9011L625
TARGET COMPOUNDS							
Methylene Chloride	20 B	3 JB	16 B	5 B	8 B	14 B	12 B
Acetone	6 JB	6 JB	7 JB	---	---	15 B	5 JB
Carbon Disulfide	3 JB	---	3 JB	---	---	---	---
Dilution Factor	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Total (Allowed) Hold Time	11(14)d	12(14)d	4(14)d	15(14)d*	6(14)d	7(14)d	6(14)d

TABLE 2B. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - VOLATILE ORGANIC TRIP BLANK DATA (Continued)

Page 2 of 2

AREA	ACID PIT EXT.	ACID PIT EXT.
LOCATION	QC	QC
TYPE OF LOCATION	TRIP BLANK	TRIP BLANK
SAMPLE NUMBER	P9030010E	P9031010E
MEDIA	WATER	WATER
UNITS	ug/L	ug/L
SDG NUMBER	9011L676	9011L702
TARGET COMPOUNDS		
Methylene Chloride	8 B	6 B
Acetone	5 JB	6 JB
Carbon Disulfide	---	---
Dilution Factor	1.000	1.000
Total (Allowed) Hold Time	9(14)d	14(14)d

RWMC Acid Pit/Pit 9 Perimeter Sampling S&A Data Document - September 1991

TABLE 3. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - SEMIVOLATILE ORGANIC DATA

Page 1 of 7

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.
LOCATION	PENETRATION 001	PENETRATION 001	PENETRATION 001	PENETRATION 002	PENETRATION 002	PENETRATION 002	PENETRATION 003
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E90010100	E90020100	E90030100	E90050100	E90060100	E90070100	E90090100
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9012L846	9012L846	9012L846	9011L786	9011L786	9011L786	9011L701
FIELD MEASUREMENTS							
Depth (ft)	0-2	8-10	20-22	0-2	8-10	16-16.9	0-2
TARGET COMPOUNDS							
Hexachlorobutadiene	---	---	---	---	---	---	---
N-Nitrosodiphenylamine (1)	50 JB	45 JB	52 JB	---	---	---	---
Di-n-butylphthalate	47 J	46 J	58 J	---	---	---	---
Butylbenzylphthalate	---	---	---	---	---	---	---
bis(2-Ethylhexyl)phthalate	---	---	---	60 J	---	---	---
Tributylphosphate	---	---	---	---	---	---	---
Dilution Factor	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total (Allowed) Hold Time	14(14)d	14(14)d	14(14)d	12(14)d	12(14)d	12(14)d	12(14)d

TABLE 3. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - SEMIVOLATILE ORGANIC DATA (Continued)

Page 2 of 7

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.
LOCATION	PENETRATION 003	PENETRATION 003	PENETRATION 003	PENETRATION 004	PENETRATION 004	PENETRATION 004	PENETRATION 005
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E90100100	E90110100	E90110100RE	E90130100	E90140100	E90150100	E90170100
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L701	9011L701	9011L701	9012L846	9012L846	9012L846	9011L750
FIELD MEASUREMENTS							
Depth (ft)	4-6	8-9.9	8-9.9	0-2	8-10	16-18	0-2
TARGET COMPOUNDS							
Hexachlorobutadiene	---	---	---	---	---	---	---
N-Nitrosodiphenylamine (1)	---	---	---	---	---	---	---
Di-n-butylphthalate	---	---	---	---	---	51 J	---
Butylbenzylphthalate	---	---	---	---	---	---	---
bis(2-Ethylhexyl)phthalate	150 J	87 J	42 J	---	---	---	1200 B
Tributylphosphate	---	---	---	---	---	---	---
Dilution Factor	1.110	1.110	1.000	1.110	1.110	1.110	1.110
Total (Allowed) Hold Time	12(14)d	12(14)d	53(14)d*	13(14)d	13(14)d	13(14)d	10(14)d

RWMC Acid Pit/Pit 9 Perimeter Sampling S&A Data Document · September 1991

TABLE 3. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - SEMIVOLATILE ORGANIC DATA (Continued)

Page 3 of 7

AREA	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.	SDA PIT 9 EXT.
LOCATION	PENETRATION 005	PENETRATION 005	PENETRATION 006	PENETRATION 006	PENETRATION 007	PENETRATION 007	PENETRATION 007
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E90180100	E90190100	E90210100	E90230100	E90250100	E90260100	E90270100
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L750	9011L750	9011L750	9011L750	9011L750	9011L750	9011L750
FIELD MEASUREMENTS							
Depth (ft)	6-8	20-20.8	0-2	4-6	0-2	8-10	14-15.4
TARGET COMPOUNDS							
Hexachlorobutadiene	---	---	---	---	---	---	---
N-Nitrosodiphenylamine (1)	---	---	---	---	---	---	---
Di-n-butylphthalate	---	---	---	---	---	---	480
Butylbenzylphthalate	---	---	---	---	---	---	---
bis(2-Ethylhexyl)phthalate	3500 B	1000 B	1800 B	2000 B	1100 B	1100 B	370 JB
Tributylphosphate	---	92 J	---	---	---	---	---
Dilution Factor	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total (Allowed) Hold Time	10(14)d	10(14)d	12(14)d	12(14)d	11(14)d	10(14)d	10(14)d

TABLE 3. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - SEMIVOLATILE ORGANIC DATA (Continued)

Page 4 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E90290100 SUBSURFACE S ug/kg 9011L786	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E90300100 SUBSURFACE S ug/kg 9011L786	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E90310100 SUBSURFACE S ug/kg 9011L786	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E90310200 SUBSURFACE S ug/kg 9011L786	ACID PIT EXT. PENETRATION 001 UNDERBURDEN P90010100 SUBSURFACE S ug/kg 9011L702	ACID PIT EXT. PENETRATION 001 UNDERBURDEN P90020100 SUBSURFACE S ug/kg 9011L702	ACID PIT EXT. PENETRATION 001 UNDERBURDEN P90030100 SUBSURFACE S ug/kg 9011L702
FIELD MEASUREMENTS							
Depth (ft)	0-2	8-10	14-15	14-15	0-2	8-10	16-18
TARGET COMPOUNDS							
Hexachlorobutadiene	---	---	---	---	---	---	---
N-Nitrosodiphenylamine (1)	---	---	---	---	---	---	---
Di-n-butylphthalate	---	---	---	---	---	---	---
Butylbenzylphthalate	---	---	---	---	---	---	---
bis(2-Ethylhexyl)phthalate	---	---	---	---	---	---	---
Tributylphosphate	---	---	---	---	---	590	---
Dilution Factor	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total (Allowed) Hold Time	11(14)d	11(14)d	11(14)d	11(14)d	12(14)d	12(14)d	12(14)d

TABLE 3. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - SEMIVOLATILE ORGANIC DATA (Continued)

Page 5 of 7

AREA	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	PENETRATION 001	PENETRATION 002	PENETRATION 002	PENETRATION 002	PENETRATION 003	PENETRATION 003	PENETRATION 003
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P90030100RE	P90050100	P90060100	P90070100	P90090100	P90100100	P90110100
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L702	9011L548	9011L548	9011L548	9011L563	9011L563	9011L563
FIELD MEASUREMENTS							
Depth (ft)	16-18	0-2	8-10	16-18	0-2	8-10	16-17.8
TARGET COMPOUNDS							
Hexachlorobutadiene	---	---	350	---	---	---	---
N-Nitrosodiphenylamine (1)	---	---	---	---	---	---	---
Di-n-butylphthalate	---	65 J	72 J	110 J	2800	4700	310 J
Butylbenzylphthalate	---	---	---	---	---	---	---
bis(2-Ethylhexyl)phthalate	---	130 JB	65 JB	160 JB	---	---	---
Tributylphosphate	---	---	---	---	---	---	---
Dilution Factor	1.110	1.000	1.000	1.000	1.110	1.110	1.110
Total (Allowed) Hold Time	12(14)d	10(14)d	10(14)d	10(14)d	12(14)d	12(14)d	12(14)d

TABLE 3. RMMC ACID PIT/PIT 9 PERIMETER SAMPLING - SEMIVOLATILE ORGANIC DATA (Continued)

Page 6 of 7

AREA	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	PENETRATION 004	PENETRATION 004	PENETRATION 004	PENETRATION 005	PENETRATION 005	PENETRATION 005	PENETRATION 005
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P90130100	P90140100	P90150100	P90170100	P90180100	P90180100RE	P90190100
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L563	9011L563	9011L563	9011L625	9011L625	9011L625	9011L625
FIELD MEASUREMENTS							
Depth (ft)	0-2	8-10	19-19.5	0-2	8-10	8-10	22-22.8
TARGET COMPOUNDS							
Hexachlorobutadiene	---	---	---	---	---	---	---
N-Nitrosodiphenylamine (1)	---	---	---	---	---	---	---
Di-n-butylphthalate	170 J	5900	3400	---	54 JB	---	---
Butylbenzylphthalate	---	150 J	---	---	---	---	---
bis(2-Ethylhexyl)phthalate	---	---	---	120 JB	---	---	---
Tributylphosphate	---	---	---	---	---	---	---
Dilution Factor	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total (Allowed) Hold Time:	11(14)d	11(14)d	11(14)d	11(14)d	11(14)d	11(14)d	11(14)d

TABLE 3. RUMC ACID PIT/PIT 9 PERIMETER SAMPLING - SEMIVOLATILE ORGANIC DATA (Continued)

Page 7 of 7

AREA	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	PENETRATION 005	PENETRATION 006	PENETRATION 006	PENETRATION 006	PENETRATION 006	PENETRATION 006	PENETRATION 006
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P90190100RE	P90210100	P90220100	P90230100	P90230100RE	P90230200	P90230200RE
MEDIA	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S	SUBSURFACE S
UNITS	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SDG NUMBER	9011L625	9011L676	9011L676	9011L676	9011L676	9011L676	9011L676
FIELD MEASUREMENTS							
Depth (ft)	22-22.8	0-2	8-10	18-18.9	18-18.9	18-18.9	18-18.9
TARGET COMPOUNDS							
Hexachlorobutadiene	---	---	---	---	---	---	---
N-Nitrosodiphenylamine (1)	---	---	---	---	---	---	---
Di-n-butylphthalate	---	1800	530	---	---	3900	4600
Butylbenzylphthalate	---	---	---	---	---	---	---
bis(2-Ethylhexyl)phthalate	---	---	---	---	---	---	---
Tributylphosphate	---	---	---	---	---	---	---
Dilution Factor	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total (Allowed) Hold Time	11(14)d	13(14)d	13(14)d	13(14)d	13(14)d	13(14)d	13(14)d

TABLE 4. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA

Page 1 of 8

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT. PENETRATION 001 UNDERBURDEN E9001010F SUBSURFACE S mg/kg 9012L846	SDA PIT 9 EXT. PENETRATION 001 UNDERBURDEN E9002010F SUBSURFACE S mg/kg 9012L846	SDA PIT 9 EXT. PENETRATION 001 UNDERBURDEN E9003010F SUBSURFACE S mg/kg 9012L846	SDA PIT 9 EXT. PENETRATION 002 UNDERBURDEN E9005010F SUBSURFACE S mg/kg 9011L786	SDA PIT 9 EXT. PENETRATION 002 UNDERBURDEN E9006010F SUBSURFACE S mg/kg 9011L786	SDA PIT 9 EXT. PENETRATION 002 UNDERBURDEN E9007010F SUBSURFACE S mg/kg 9011L786
FIELD MEASUREMENTS						
Depth (ft)	0-2	8-10	20-22	0-2	8-10	16-16.9
ANALYTES						
Aluminum	11600	4420	9200	9430 E	2920 E	7440 E
Antimony	---	---	---	6.8 BN	---	---
Arsenic	6.0 S	5.4 S	2.8 S	4.7 NS	2.4 N	4.0 N
Barium	223	94.3	170	180 E*	55.0 E*	168 E*
Beryllium	0.95 B	0.46 B	0.77 B	0.85 B	0.30 B	0.62 B
Cadmium	---	---	---	---	---	---
Calcium	42200	12400	25500	25600 E	12400 E	93500 E
Chromium	14.2	8.4	10.6	13.3	7.4	9.8
Cobalt	9.9 B	6.3 B	11.5	9.9 B	4.3 B	7.2 B
Copper	15.6	12.4	11.7	15.9	9.6	19.7
Cyanide	---	---	---	---	---	---
Iron	17600	10400	17700	16500 E	7650 E	12700 E
Lead	12.4	7.2 B	6.1 B	12.2 N	4.6 N	9.1 N
Magnesium	9700	4020	10500	7500 E	2740 E	9740 E
Manganese	404	239	418	367 E	196 E	251 E
Mercury	---	---	---	---	---	---
Nickel	25.4	18.9	18.6	25.2	20.0	17.8
Potassium	1890	680 B	1390	1510	449 B	1130 B
Selenium	---	---	---	---	---	---
Silver	---	---	---	2.1 N*	---	---
Sodium	151 B	177 B	826 B	161 B	78.4 B	373 B
Thallium	---	---	---	---	---	---
Tin	---	---	---	---	---	---
Vanadium	23.2	15.1	23.5	24.1	12.9	20.9
Zinc	73.3	50.0	51.8	73.1	41.0	48.8
% Solids	93.2	96.6	91.1	96.4	97.9	80.4
Total (Allowed) Hold Time ^a	57(180)d	57(180)d	57(180)d	59(180)d	59(180)d	59(180)d
Total (Allowed) Hold Time ^b	19(26)d	19(26)d	19(26)d	21(26)d	21(26)d	21(26)d
Total (Allowed) Hold Time ^c	57(180)d	57(180)d	57(180)d	59(180)d	59(180)d	59(180)d
Total (Allowed) Hold Time ^d	14(12)d*	14(12)d*	14(12)d*	15(12)d*	15(12)d*	15(12)d*

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

TABLE 4. RMMC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA (Continued)

Page 2 of 8

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT. PENETRATION 003 UNDERBURDEN E9009010F SUBSURFACE S mg/kg 9011L701	SDA PIT 9 EXT. PENETRATION 003 UNDERBURDEN E9010010F SUBSURFACE S mg/kg 9011L701	SDA PIT 9 EXT. PENETRATION 003 UNDERBURDEN E9011010F SUBSURFACE S mg/kg 9011L701	SDA PIT 9 EXT. PENETRATION 004 UNDERBURDEN E9013010F SUBSURFACE S mg/kg 9012L846	SDA PIT 9 EXT. PENETRATION 004 UNDERBURDEN E9014010F SUBSURFACE S mg/kg 9012L846	SDA PIT 9 EXT. PENETRATION 004 UNDERBURDEN E9015010F SUBSURFACE S mg/kg 9012L846
FIELD MEASUREMENTS						
Depth (ft)	0-2	4-6	8-9.9	0-2	8-10	16-18
ANALYTES						
Aluminum	7360	5250	5740	11800	13400	9530
Antimony	---	---	---	---	---	---
Arsenic	4.8 NS	5.9 NS	3.8 NS	5.1 S	6.8 S	4.6 S
Barium	239	134	228	243	237	222
Beryllium	0.75 B	0.59 B	0.50 B	0.96 B	1.1	0.83 B
Cadmium	---	---	---	---	---	---
Calcium	44800	30900	149000	41300	15300	30400
Chromium	10.2	9.5	9.1	14.8	14.2	9.1
Cobalt	10.2	6.8 B	6.6 B	10.0 B	10.8 B	11.0 B
Copper	16.4	14.3	24.5	18.7	18.7	13.8
Cyanide	NR	NR	NR	---	---	---
Iron	13000	12300	9820	18700	19100	17200
Lead	7.2 BNS	9.0 N*	7.2 N*	11.8	14.8	10.3 B
Magnesium	8240	6760	11000	9150	7500	11800
Manganese	597	279	220	417	517	461
Mercury	---	---	---	---	---	---
Nickel	27.2	19.8	21.0	23.0	23.7	22.7
Potassium	1470	1110	970 B	2470	2870	1350
Selenium	---	---	---	---	---	---
Silver	---	---	---	---	---	---
Sodium	226 B	120 B	315 B	482 B	239 B	297 B
Thallium	---	---	---	---	---	---
Tin	---	---	---	---	---	---
Vanadium	20.7	19.4	18.9	26.2	22.1	16.8
Zinc	66.1 E	63.3 E	32.4 E	73.6	70.6	58.7
% Solids	96.2	94.7	82.3	93.7	84.3	85.2
Total (Allowed) Hold Time ^a	62(180)d	62(180)d	62(180)d	56(180)d	56(180)d	56(180)d
Total (Allowed) Hold Time ^b	27(26)d*	27(26)d*	27(26)d*	18(26)d	18(26)d	18(26)d
Total (Allowed) Hold Time ^c	62(180)d	62(180)d	62(180)d	56(180)d	56(180)d	56(180)d
Total (Allowed) Hold Time ^d				14(12)d*	14(12)d*	14(12)d*

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

TABLE 4. RMMC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA (Continued)

Page 3 of 8

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT. PENETRATION 005 UNDERBURDEN E9017010F SUBSURFACE S mg/kg 9011L750	SDA PIT 9 EXT. PENETRATION 005 UNDERBURDEN E9018010F SUBSURFACE S mg/kg 9011L750	SDA PIT 9 EXT. PENETRATION 005 UNDERBURDEN E9019010F SUBSURFACE S mg/kg 9011L750	SDA PIT 9 EXT. PENETRATION 006 UNDERBURDEN E9021010F SUBSURFACE S mg/kg 9011L750	SDA PIT 9 EXT. PENETRATION 006 UNDERBURDEN E9023010F SUBSURFACE S mg/kg 9011L750	SDA PIT 9 EXT. PENETRATION 007 UNDERBURDEN E9025010F SUBSURFACE S mg/kg 9011L750
FIELD MEASUREMENTS						
Depth (ft)	0-2	6-8	20-20.8	0-2	4-6	0-2
ANALYTES						
Aluminum	11400	9370	6070	8710	8590	9790
Antimony	---	---	---	---	---	---
Arsenic	4.2	5.0 S	2.5 S	4.1	4.0	4.3
Barium	256	220	190	192	226	233
Beryllium	1.0 B	0.83 B	0.58 B	0.80 B	0.83 B	0.96 B
Cadmium	---	---	---	---	---	---
Calcium	51900	43300	78400	40000	23700	35000
Chromium	12.1	11.9	10.4	10.6	11.2	9.9
Cobalt	8.6 B	11.3	9.1 B	7.9 B	10.2 B	9.2 B
Copper	17.7	16.8	16.3	15.4	15.8	18.0
Cyanide	---	---	---	---	---	---
Iron	15100	16200	14900	14400	17400	16400
Lead	13.7	16.2	11.3	26.0	14.7	15.5 S
Magnesium	9950	9460	9860	7520	7740	7820
Manganese	330	617	324	320	434	379
Mercury	---	---	---	---	---	---
Nickel	20.1	23.9	25.1	22.0	29.3	21.6
Potassium	3070	1720	1090 B	1820	2040	2230
Selenium	---	---	---	---	---	---
Silver	---	---	---	---	---	---
Sodium	156 B	384 B	1020 B	122 B	153 B	112 B
Thallium	---	---	---	---	---	---
Tin	---	---	---	---	---	---
Vanadium	22.4	20.3	17.0	16.4	15.0	14.8
Zinc	61.8	63.7	47.7	58.9	107	64.9
% Solids	93.0	87.6	86.6	95.1	88.4	93.9
Total (Allowed) Hold Time ^a	56(180)d	56(180)d	56(180)d	58(180)d	58(180)d	57(180)d
Total (Allowed) Hold Time ^b	22(26)d	22(26)d	22(26)d	24(26)d	24(26)d	23(26)d
Total (Allowed) Hold Time ^c	56(180)d	56(180)d	56(180)d	58(180)d	58(180)d	57(180)d
Total (Allowed) Hold Time ^d	20(12)d*	20(12)d*	20(12)d*	22(12)d*	22(12)d*	21(12)d*

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

TABLE 4. RWC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA (Continued)

Page 4 of 8

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT. PENETRATION 007 UNDERBURDEN E9026010F SUBSURFACE S mg/kg 9011L750	SDA PIT 9 EXT. PENETRATION 007 UNDERBURDEN E9027010F SUBSURFACE S mg/kg 9011L750	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E9029010F SUBSURFACE S mg/kg 9011L786	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E9030010F SUBSURFACE S mg/kg 9011L786	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E9031010F SUBSURFACE S mg/kg 9011L786	SDA PIT 9 EXT. PENETRATION 008 UNDERBURDEN E9031020F SUBSURFACE S mg/kg 9011L786
FIELD MEASUREMENTS						
Depth (ft)	8-10	14-15.4	0-2	8-10	14-15	14-15
ANALYTES						
Aluminum	3480	12600	10900 E	3350 E	10000 E	10200 E
Antimony	---	---	---	---	6.9 BN	---
Arsenic	4.5	3.6	7.1 NS	4.4 NS	3.5 NS	5.0 NS
Barium	81.0	152	220 E*	62.0 E*	246 E*	181 E*
Beryllium	0.33 B	1.2	0.94 B	0.36 B	0.88 B	0.75 B
Cadmium	---	---	---	---	---	---
Calcium	15700	27100	41000 E	12100 E	66200 E	82500 E
Chromium	7.1	17.1	12.3	8.9	12.3	11.7
Cobalt	4.8 B	8.8 B	9.4 B	5.2 B	9.3 B	9.4 B
Copper	11.2	28.7	15.7	11.4	16.9	16.2
Cyanide	---	---	---	---	---	---
Iron	8530	18100	16900 E	8870 E	16400 E	16400 E
Lead	8.0	13.8	12.0 N	6.2 BN	8.0 BN	8.0 BN
Magnesium	4490	8740	9020 E	3420 E	9660 E	9620 E
Manganese	191	271	381 E	164 E	350 E	316 E
Mercury	---	---	---	---	---	---
Nickel	18.6	31.8	22.8	18.8	23.3	18.8
Potassium	764 B	3070	2080	575 B	1840	1980
Selenium	---	---	---	---	---	---
Silver	---	---	---	---	---	---
Sodium	136 B	605 B	210 B	174 B	870 B	894 B
Thallium	---	---	---	---	---	---
Tin	---	---	---	---	---	---
Vanadium	9.5	17.5	22.9	13.6	20.8	21.6
Zinc	54.2	71.9	72.4	48.0	59.1	53.9
% Solids	98.6	81.1	93.8	98.2	83.4	82.9
Total (Allowed) Hold Time ^a	56(180)d	56(180)d	58(180)d	58(180)d	58(180)d	58(180)d
Total (Allowed) Hold Time ^b	22(26)d	22(26)d	20(26)d	20(26)d	20(26)d	20(26)d
Total (Allowed) Hold Time ^c	56(180)d	56(180)d	58(180)d	58(180)d	58(180)d	58(180)d
Total (Allowed) Hold Time ^d	20(12)d*	20(12)d*	14(12)d*	14(12)d*	14(12)d*	14(12)d*

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

TABLE 4. RWM ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA (Continued)

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	ACID PIT EXT. PENETRATION 001 UNDERBURDEN P9001010F SUBSURFACE S mg/kg 9011L702	ACID PIT EXT. PENETRATION 001 UNDERBURDEN P9002010F SUBSURFACE S mg/kg 9011L702	ACID PIT EXT. PENETRATION 001 UNDERBURDEN P9003010F SUBSURFACE S mg/kg 9011L702	ACID PIT EXT. PENETRATION 002 UNDERBURDEN P9005010F SUBSURFACE S mg/kg 9011L548	ACID PIT EXT. PENETRATION 002 UNDERBURDEN P9006010F SUBSURFACE S mg/kg 9011L548	ACID PIT EXT. PENETRATION 002 UNDERBURDEN P9007010F SUBSURFACE S mg/kg 9011L548
FIELD MEASUREMENTS						
Depth (ft)	0-2	8-10	16-18	0-2	8-10	16-18
ANALYTES						
Aluminum	9990	3800	4120	8970 *	6480 *	7900 *
Antimony	---	---	---	---	---	---
Arsenic	4.3 S	3.5 S	3.1 S	4.4 S	9.4 S	3.3
Barium	250	149	222	217	266	169
Beryllium	0.87 B	0.57 B	0.53 B	0.72 B	0.69 B	0.60 B
Cadmium	---	---	---	0.77 B	0.91	---
Calcium	51700	30400	122000 E	41400	54600	91000
Chromium	11.0	7.5	4.4	9.1 *	12.5 *	12.8 *
Cobalt	9.1 B	6.5 B	5.6 B	10.7	11.7	16.7
Copper	14.8	12.1	12.0	12.4	18.2	18.0
Cyanide	---	---	NR	---	---	---
Iron	13700	8710	7080	13700	15000	23200
Lead	0.84 BN	9.3 BN	0.65 BN	11.9	13.0	4.9 S
Magnesium	10100	6790 E	7550	8480	12600	14900
Manganese	459 N	236 N	193 N	498 N	409 N	348 N
Mercury	---	---	---	---	---	---
Nickel	20.4	23.7	11.3	20.9 N*	40.2 N*	112 N*
Potassium	1770	767 B	686 B	1470	709 B	1290
Selenium	---	---	---	---	---	---
Silver	---	---	---	---	---	---
Sodium	238 B	215 B	459 B	176 B	193 B	981 B
Thallium	---	---	---	---	---	---
Tin	---	---	---	---	---	---
Vanadium	25.2	16.9	19.8	19.9	21.3	32.4
Zinc	50.1 E	72.4 E	21.9 E	45.9 E	119 E	46.2 E
% Solids	94.2	97.2	81.4	89.5	93.7	79.7
Total (Allowed) Hold Time ^a	54(180)d	54(180)d	54(180)d	62(180)d	62(180)d	67(180)d
Total (Allowed) Hold Time ^b	28(26)d*	28(26)d*	28(26)d*	20(26)d	20(26)d	20(26)d
Total (Allowed) Hold Time ^c	54(180)d	54(180)d	54(180)d	62(180)d	62(180)d	67(180)d
Total (Allowed) Hold Time ^d	12(12)d	12(12)d	---	20(12)d*	20(12)d*	20(12)d*

a. ICP

b. CVAAS

c. GFAAS

d. Cyanide

TABLE 4. RMC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA (Continued)

Page 6 of 8

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	ACID PIT EXT. PENETRATION 003 UNDERBURDEN P9009010F SUBSURFACE S mg/kg 9011L563	ACID PIT EXT. PENETRATION 003 UNDERBURDEN P9010010F SUBSURFACE S mg/kg 9011L563	ACID PIT EXT. PENETRATION 003 UNDERBURDEN P9011010F SUBSURFACE S mg/kg 9011L563	ACID PIT EXT. PENETRATION 004 UNDERBURDEN P9013010F SUBSURFACE S mg/kg 9011L563	ACID PIT EXT. PENETRATION 004 UNDERBURDEN P9014010F SUBSURFACE S mg/kg 9011L563	ACID PIT EXT. PENETRATION 004 UNDERBURDEN P9015010F SUBSURFACE S mg/kg 9011L563
FIELD MEASUREMENTS						
Depth (ft)	0-2	8-10	16-17.8	0-2	8-10	19-19.5
ANALYTES						
Aluminum	6390	3430	6790	7650	5390	5400
Antimony	---	---	---	---	---	---
Arsenic	5.1 S	5.9 S	3.8 S	4.8 S	7.3 S	5.9 S
Barium	197	168	277	220	244	160
Beryllium	0.56 B	0.45 B	0.57 B	0.74 B	0.61 B	0.35 B
Cadmium	---	0.87 B	1.1 B	---	---	---
Calcium	48700	29900	140000	52100	46500	103000
Chromium	9.1	7.1	8.3	8.4	9.2	4.3
Cobalt	8.3 B	6.3 B	6.4 B	8.7 B	10.1 B	15.4
Copper	11.0	10.4	14.4	12.4	16.4	17.3
Cyanide	---	---	---	---	---	---
Iron	9400	8390	8700	10100	12000	18900
Lead	9.9	8.8 S	8.7	12.1	8.6	4.3 S
Magnesium	7560	6500	8640	8490	11000	12900
Manganese	338	192	192	417	407	333
Mercury	---	---	---	---	---	---
Nickel	594	22.5	14.0	16.4	34.0	199
Potassium	1330	596 B	1500	1730	863 B	646 B
Selenium	---	---	---	---	---	---
Silver	---	---	---	---	---	---
Sodium	173 B	89.1 B	432 B	133 B	364 B	962 B
Ithallium	---	---	---	---	---	---
Tin	---	---	---	---	---	---
Vanadium	15.3	12.3	18.6	18.1	18.6	18.7
Zinc	50.2	68.6	36.5	41.1	110	28.3
% Solids	95.0	95.2	81.3	92.8	92.0	89.0
Total (Allowed) Hold Time ^a	61(180)d	61(180)d	61(180)d	60(180)d	60(180)d	60(180)d
Total (Allowed) Hold Time ^b	22(26)d	22(26)d	22(26)d	21(26)d	21(26)d	21(26)d
Total (Allowed) Hold Time ^c	61(180)d	61(180)d	61(180)d	60(180)d	60(180)d	60(180)d
Total (Allowed) Hold Time ^d	19(12)d*	19(12)d*	19(12)d*	18(12)d*	19(12)d*	19(12)d*

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

TABLE 4. RWC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA (Continued)

Page 7 of 8

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	ACID PIT EXT. PENETRATION 005 UNDERBURDEN P9017010F SUBSURFACE S mg/kg 9011L625	ACID PIT EXT. PENETRATION 005 UNDERBURDEN P9018010F SUBSURFACE S mg/kg 9011L625	ACID PIT EXT. PENETRATION 005 UNDERBURDEN P9019010F SUBSURFACE S mg/kg 9011L625	ACID PIT EXT. PENETRATION 006 UNDERBURDEN P9021010F SUBSURFACE S mg/kg 9011L676	ACID PIT EXT. PENETRATION 006 UNDERBURDEN P9022010F SUBSURFACE S mg/kg 9011L676	ACID PIT EXT. PENETRATION 006 UNDERBURDEN P9023010F SUBSURFACE S mg/kg 9011L676
FIELD MEASUREMENTS						
Depth (ft)	0-2	8-10	22-22.8	0-2	8-10	18-18.9
ANALYTES						
Aluminum	13600 E*	7440 E*	9400 E*	12700	4700	6100
Antimony	---	---	---	---	---	---
Arsenic	4.9 N	8.2 SN	4.0 SN	6.0 S	6.5 S	4.6 S
Barium	257 E	204 E	247 E	278	137	181
Beryllium	---	0.66	0.67 B	0.94	0.45 B	0.55 B
Cadmium	---	1.0	---	0.70 B	0.81 B	---
Calcium	60900 E	36800 E	61400 E	52100	7500	91500
Chromium	13.8 *	12.4 *	10.6 *	11.8	12.0	8.4
Cobalt	10.3	10.8	8.7	9.7	6.8 B	7.4 B
Copper	14.0	17.8	16.1	15.7	11.2	16.1
Cyanide	---	---	---	---	---	---
Iron	17300 E*	15900 E*	14300 E*	16400	11400	9500
Lead	12.1 SN	12.2 N	9.1 SN	15.2	7.5	11.4
Magnesium	11000 E	11400 E	11200 E	10600	6000	8400
Manganese	424 E	470 E	326 E	413	340	260
Mercury	---	---	---	---	---	---
Nickel	20.9	35.5	18.1	20.9	25.2	18.1
Potassium	2110	1290	1770	2350	800	1100
Selenium	---	---	---	---	---	---
Silver	---	---	0.85 N	---	---	0.80 B
Sodium	299	191	664	180 B	123	516
Thallium	---	---	---	---	---	---
Tin	---	---	---	---	---	---
Vanadium	23.4	21.3	21.1	19.3	16.8	17.9
Zinc	56.8 *	119 *	53.4 *	60.0	65.9	42.0
% Solids	92.2	90.6	82.8	94.3	95.8	81.3
Total (Allowed) Hold Time ^a	56(180)d	56(180)d	56(180)d	55(180)d	55(180)d	55(180)d
Total (Allowed) Hold Time ^b	28(26)d*	28(26)d*	28(26)d*	27(26)d*	27(26)d*	27(26)d*
Total (Allowed) Hold Time ^c	56(180)d	56(180)d	56(180)d	55(180)d	55(180)d	55(180)d
Total (Allowed) Hold Time ^d	14(12)d*	14(12)d*	14(12)d*	14(12)d*	14(12)d*	14(12)d*

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

TABLE 4 RWC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC DATA (Continued)

AREA	ACID PIT EXT.
LOCATION	PENETRATION 006
TYPE OF LOCATION	UNDERBURDEN
SAMPLE NUMBER	P9023020F
MEDIA	SUBSURFACE S
UNITS	mg/kg
SDG NUMBER	9011L676

FIELD MEASUREMENTS

Depth (ft)	18-18.9
------------	---------

ANALYTES

Aluminum	7400
Antimony	5.2 B
Arsenic	6.8 S
Barium	170
Beryllium	0.65 B

Cadmium	1.1 B
Calcium	82000
Chromium	10.4
Cobalt	8.7 B
Copper	17.3

Cyanide	---
Iron	12200
Lead	12.0
Magnesium	9000
Manganese	300

Mercury	---
Nickel	21.0
Potassium	1400
Selenium	---
Silver	---

Sodium	550
Thallium	---
Tin	---
Vanadium	21.0
Zinc	51.7

% Solids	81.4
Total (Allowed) Hold Time ^a	55(180)d
Total (Allowed) Hold Time ^b	27(26)d*
Total (Allowed) Hold Time ^c	55(180)d
Total (Allowed) Hold Time ^d	14(12)d*

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

TABLE 4A RMC ACID PIT/PIT 9 PERIMETER SAMPLING - INORGANIC RINSATE DATA

Page 1 of 1

AREA .	SDA PIT 9 EXT.	SDA PIT 9 EXT.	ACID PIT EXT.	ACID PIT EXT.
LOCATION	QC	QC	QC	QC
TYPE OF LOCATION	RINSATE	RINSATE	RINSATE	RINSATE
SAMPLE NUMBER	E9033010F	E9034010F	P9025010F	P9026010F
MEDIA	WATER	WATER	WATER	WATER
UNITS	ug/L	ug/L	ug/L	ug/L
SDG NUMBER	9012L846	9011L750	9011L563	9011L702
<hr/>				
ANALYTES				
Aluminum	---	2170 NE	---	---
Antimony	---	---	---	---
Arsenic	---	---	2.0 B	---
Barium	---	27.0 BE	---	---
Beryllium	---	---	---	---
Cadmium	---	---	---	---
Calcium	463 B	3470 BE	---	---
Chromium	---	---	---	---
Cobalt	---	---	---	---
Copper	---	6.2 B	5.5 B	---
Cyanide	NR	NR	NR	---
Iron	---	4480 E	---	---
Lead	---	60.4 NS*	3.0 BS	---
Magnesium	---	---	---	---
Manganese	---	75.0 E	3.4 B	---
Mercury	---	---	---	---
Nickel	---	---	---	---
Potassium	---	1280 B	---	---
Selenium	3.1 BW	---	---	---
Silver	---	---	---	---
Sodium	966 B	1690 B	---	111 B
Thallium	---	---	---	---
Tin	---	---	---	---
Vanadium	---	---	---	---
Zinc	8.8 B	40.8 E	23.2	8.0 B
% Solids				
Total (Allowed) Hold Time ^a	56(180)d	56(180)d	60(180)d	54(180)d
Total (Allowed) Hold Time ^b	19(26)d	22(26)d	19(26)d	28(26)d*
Total (Allowed) Hold Time ^c	56(180)d	56(180)d	60(180)d	54(180)d
Total (Allowed) Hold Time ^d				12(12)d

- a. ICP
b. CVAAS
c. GFAAS
d. Cyanide

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990

Table 5. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - TOTAL PETROLEUM HYDROCARBONS.

Page 1 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT PENETRATION 001 UNDERBURDEN E9001010M SUBSURFACE SOIL mg/kg 9012L846	SDA PIT 9 EXT PENETRATION 001 UNDERBURDEN E9002010M SUBSURFACE SOIL mg/kg 9012L846	SDA PIT 9 EXT PENETRATION 001 UNDERBURDEN E9003010M SUBSURFACE SOIL mg/kg 9012L846	SDA PIT 9 EXT PENETRATION 002 UNDERBURDEN E9005010M SUBSURFACE SOIL mg/kg 9011L786	SDA PIT 9 EXT PENETRATION 002 UNDERBURDEN E9006010M SUBSURFACE SOIL mg/kg 9011L786	SDA PIT 9 EXT PENETRATION 002 UNDERBURDEN E9007010M SUBSURFACE SOIL mg/kg 9011L786
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	8-10	20-22	0-2	8-10	16-16.9
<u>TOTAL PETROLEUM HYDROCARBONS</u>	9.48	4.008	4.58	5.88	4.108	3.108

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 5. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - TOTAL PETROLEUM HYDROCARBONS.

Page 2 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT PENETRATION 003 UNDERBURDEN E9009010M SUBSURFACE SOIL mg/kg 9011L701	SDA PIT 9 EXT PENETRATION 003 UNDERBURDEN E9010010M SUBSURFACE SOIL mg/kg 9011L701	SDA PIT 9 EXT PENETRATION 003 UNDERBURDEN E9011010M SUBSURFACE SOIL mg/kg 9011L701	SDA PIT 9 EXT PENETRATION 004 UNDERBURDEN E9013010M SUBSURFACE SOIL mg/kg 9012L846	SDA PIT 9 EXT PENETRATION 004 UNDERBURDEN E9014010M SUBSURFACE SOIL mg/kg 9012L846	SDA PIT 9 EXT PENETRATION 004 UNDERBURDEN E9015010M SUBSURFACE SOIL mg/kg 9012L846
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	4-6	8-9.9	0-2	8-10	16-18
<u>TOTAL PETROLEUM HYDROCARBONS</u>	14B	330B	5.1B	5.0B	4.2B	/ 1B

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 5. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - TOTAL PETROLEUM HYDROCARBONS.

Page 3 of 7

AREA	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT
LOCATION	PENETRATION 005	PENETRATION 005	PENETRATION 005	PENETRATION 006	PENETRATION 006	PENETRATION 007
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9017010M	E9018010M	E9019010M	E9021010M	E9023010M	E9025010M
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SDG NUMBER	9011L750	9011L750	9011L750	9011L750	9011L750	9011L750
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	6-8	20-20.8	0-2	4-6	0-2
<u>TOTAL PETROLEUM HYDROCARBONS</u>	5.4B	5.1B	9.2B	11B	7.7B	39B

RWC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 5. RWC ACID PIT/PIT 9 PERIMETER SAMPLING - TOTAL PETROLEUM HYDROCARBONS.

Page 4 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT PENETRATION 007 UNDERBURDEN E9026010M SUBSURFACE SOIL mg/kg 9011L750	SDA PIT 9 EXT PENETRATION 007 UNDERBURDEN E9027010M SUBSURFACE SOIL mg/kg 9011L750	SDA PIT 9 EXT PENETRATION 008 UNDERBURDEN E9029010M SUBSURFACE SOIL mg/kg 9011L786	SDA PIT 9 EXT PENETRATION 008 UNDERBURDEN E9030010M SUBSURFACE SOIL mg/kg 9011L786	SDA PIT 9 EXT PENETRATION 008 UNDERBURDEN E9031010M SUBSURFACE SOIL mg/kg 9011L786	SDA PIT 9 EXT PENETRATION 008 UNDERBURDEN E9031020M SUBSURFACE SOIL mg/kg 9011L786
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	8-10	14-15.4	0-2	8-10	14-15	14-15
<u>TOTAL PETROLEUM HYDROCARBONS</u>	6.88	3.3JB	6.78	4.68	4.40B	2.5JB

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990

Table 5. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - TOTAL PETROLEUM HYDROCARBONS.

Page 5 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	ACID PIT EXT PENETRATION 001 UNDERBURDEN P9001010M SUBSURFACE SOIL mg/kg 9011L702	ACID PIT EXT PENETRATION 001 UNDERBURDEN P9002010M SUBSURFACE SOIL mg/kg 9011L702	ACID PIT EXT PENETRATION 001 UNDERBURDEN P9003010M SUBSURFACE SOIL mg/kg 9011L702	ACID PIT EXT PENETRATION 002 UNDERBURDEN P9005010M SUBSURFACE SOIL mg/kg 9011L548	ACID PIT EXT PENETRATION 002 UNDERBURDEN P9006010M SUBSURFACE SOIL mg/kg 9011L548	ACID PIT EXT PENETRATION 002 UNDERBURDEN P9007010M SUBSURFACE SOIL mg/kg 9011L548
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	8-10	20-22	0-2	8-10	16-16.9
<u>TOTAL PETROLEUM HYDROCARBONS</u>	12.08	5.68	3.558	13	6.108	9.68

RMMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 5. RMMC ACID PIT/PIT 9 PERIMETER SAMPLING - TOTAL PETROLEUM HYDROCARBONS.

Page 6 of 7

AREA	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT
LOCATION	PENETRATION 003	PENETRATION 003	PENETRATION 003	PENETRATION 004	PENETRATION 004	PENETRATION 004
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P9009010M	P9010010M	P9011010M	P9013010M	P9014010M	P9015010M
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SDG NUMBER	9011L563	9011L563	9011L563	9012L563	9012L563	9012L563
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	4-6	8-9.9	0-2	8-10	16-18
<u>TOTAL PETROLEUM HYDROCARBONS</u>	178	3.7JB	2.6JB	8.88	NR	11.0(Rep. 9.2J)B

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 5. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - TOTAL PETROLEUM HYDROCARBONS.

Page 7 of 7

AREA	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT
LOCATION	PENETRATION 005	PENETRATION 005	PENETRATION 005	PENETRATION 006	PENETRATION 006	PENETRATION 006
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P9017010M	P9018010M	P9019010M	P9021010M	P9022010M	P9023010M
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SDG NUMBER	9011L625	9011L625	9011L625	9011L676	9011L676	9011L676
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	6-8	20-20.8	0-2	8-10	18-18.9
<u>TOTAL PETROLEUM HYDROCARBONS</u>	7.0B	4.5B	4.6UB	12B	3.8UB	4.9(Rep 5.4)UB

U = Compound was analyzed for but not detected. The detection limit for the sample (not method detection limit) is reported with U (e.g., 10U).

J = Indicates an estimated value. This flag is used in case where a target analyte is detected at a level less than the lower quantification level. If the limit of quantification is 10 mg/L and a concentration of 3 mg/L is calculated it is reported 3 J.

B = Indicates contaminant was detected in the method blank (blank contamination for total petroleum hydrocarbons ranged from 2.9 to 4.0 mg/kg).

NR = Not reported.

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990

Table 6. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - EDTA.

Page 1 of 7

AREA	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT
LOCATION	PENETRATION 001	PENETRATION 001	PENETRATION 001	PENETRATION 002	PENETRATION 002	PENETRATION 002
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9001010C	E9002010C	E9003010M	E9005010C	E9006010C	E9007010C
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
SDG NUMBER	9012L846	9012L846	9012L846	9011L786	9011L7861	9011L786
FIELD MEASUREMENTS						
Depth (ft)	0-2	8-10	20-22	0-2	8-10	16-16.9
EDTA	1.117UB	1.082UB	1.026JB	1.081UB	1.064UB	1.304UB

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 6. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - EDTA.

Page 2 of 7

AREA	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT
LOCATION	PENETRATION 003	PENETRATION 003	PENETRATION 003	PENETRATION 004	PENETRATION 004	PENETRATION 004
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9009010C	E9010010C	E9011010C	E9013010C	E9014010C	E9015010C
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
SDG NUMBER	9011L701	9011L701	9011L701	9012L846	9012L846	9012L846
FIELD MEASUREMENTS						
Depth (ft)	0-2	4-6	8-9.9	0-2	8-10	16-18
<u>EDTA</u>	0.670JB	1.101UB	1.269UB	0.979JB	1.243UB	1.227UB

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 6. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - EDTA.

Page 3 of 7

AREA LOCATION TYPE OF LOCATION SAMPLE NUMBER MEDIA UNITS SDG NUMBER	SDA PIT 9 EXT PENETRATION 005 UNDERBURDEN E9017010C SUBSURFACE SOIL $\mu\text{g/g}$ 9011L750	SDA PIT 9 EXT PENETRATION 005 UNDERBURDEN E9018010C SUBSURFACE SOIL $\mu\text{g/g}$ 9011L750	SDA PIT 9 EXT PENETRATION 005 UNDERBURDEN E9019010C SUBSURFACE SOIL $\mu\text{g/g}$ 9011L750	SDA PIT 9 EXT PENETRATION 006 UNDERBURDEN E9021010C SUBSURFACE SOIL $\mu\text{g/g}$ 9011L750	SDA PIT 9 EXT PENETRATION 006 UNDERBURDEN E9023010C SUBSURFACE SOIL $\mu\text{g/g}$ 9011L750	SDA PIT 9 EXT PENETRATION 007 UNDERBURDEN E9025010C SUBSURFACE SOIL $\mu\text{g/g}$ 9011L750
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	6-8	20-20.8	0-2	4-6	0-2
<u>EDTA</u>	1.127UB	0.747JB	1.527B	1.032UB	1.156UB	1.064UB

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 6. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - EDTA.

Page 4 of 7

AREA	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT	SDA PIT 9 EXT
LOCATION	PENETRATION 007	PENETRATION 007	PENETRATION 008	PENETRATION 008	PENETRATION 008	PENETRATION 008
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	E9026010C	E9027010C	E9029010C	E9030010C	E9031010C	E9031020C
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
SDG NUMBER	9011L750	9011L750	9011L786	9011L786	9011L786	9011L786
<hr/>						
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	8-10	14-15.4	0-2	8-10	14-15	14-15
<u>EDTA</u>	1.042UB	0.890JB	1.115UB	1.064UB	1.500B	1.448B

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990

Table 6. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - EDTA.

Page 5 of 7

AREA	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT
LOCATION	PENETRATION 001	PENETRATION 001	PENETRATION 001	PENETRATION 002	PENETRATION 002	PENETRATION 002
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P9001010C	P9002010C	P9003010M	P9005010C	P9006010C	P9007010C
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
SDG NUMBER	90110702	9011L702	9011L702	9011L548	9011L548	9011L548
FIELD MEASUREMENTS						
Depth (ft)	0-2	8-10	16-18	0-2	8-10	16-16.9
EDTA	1.075UB	1.075UB	0.856JB	1.155UB	1.106UB	0.701JB

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 6. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - EDTA.

Page 6 of 7

AREA	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT
LOCATION	PENETRATION 003	PENETRATION 003	PENETRATION 003	PENETRATION 004	PENETRATION 004	PENETRATION 004
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P9009010C	P9010010C	P9011010C	P9013010C	P9014010C	P9015010C
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
SDG NUMBER	9011L563	9011L563	9011L563	9011L563	9011L563	9011L563
FIELD MEASUREMENTS						
Depth (ft)	0-2	8-10	16-17.8	0-2	8-10	19-19.5
EDTA	1.098UB	1.101UB	0.752UB	1.124UB	1.138UB	1.170UB

RWMC Acid Pit/Pit 9 Perimeter Sampling Data - November 1990 (continued)

Table 6. RWMC ACID PIT/PIT 9 PERIMETER SAMPLING - EDTA.

Page 7 of 7

AREA	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT	ACID PIT EXT
LOCATION	PENETRATION 005	PENETRATION 005	PENETRATION 005	PENETRATION 006	PENETRATION 006	PENETRATION 006
TYPE OF LOCATION	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN	UNDERBURDEN
SAMPLE NUMBER	P9017010C	P9018010C	P9019010C	P9021010C	P9022010C	P9023010C
MEDIA	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL	SUBSURFACE SOIL
UNITS	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
SDG NUMBER	9011L625	9011L625	9011L625	9011L676	9011L676	9011L676
<u>FIELD MEASUREMENTS</u>						
Depth (ft)	0-2	8-10	22-22.8	0-2	8-10	18-18.9
EDTA	1.096UB	1.141UB	0.765JB	1.087UB	1.093UB	0.738 (Rep 1.290)U

U = Compound was analyzed for but not detected. The detection limit for the sample (not method detection limit) is reported with U (e.g., 10U).

J = Indicates an estimated value. This flag is used in case where a target analyte is detected at a level less than the lower quantification level. If the limit of quantification is 10 mg/L and a concentration of 3 mg/L is calculated it is reported 3 J.

B = Indicates contaminant was detected in the method blank

NR = Not reported.

Table.7 Results of Manmade Gamma-Emitting Radionuclides RWMC Subpit Sampling Pit-9 Soils.

Page 1 of 1

ERP Sample ID	Penetration Number	Depth (ft)	Radionuclide (gamma)		Activity(T) ¹ (pCi/g)
E9001010A	01	0	Am	241	(+1.21 +/- .16)E-01
E9006010A	02	8-10	Am	241	(+2.12 +/- .38)E+00
E9009010A	03	0-2	Cs	137	(+2.30 +/- .31)E-01
			Am	241	(+6.25 +/- 1.2)E-01
E9010010A	03	4-6	Cs	137	(+9.41 +/- 1.2)E-01
			Am	241	(+5.15 +/- .83)E+00
E9013010A	04	0-2	Cs	137	(+8.25 +/- 2.0)E-02
			Am	241	(+5.61 +/- .45)E-01
E9017010A	05	0-2	Am	241	(+1.33 +/- .17)E-01
E9025010A	07	0-2	Cs	241	(+2.55 +/- .38)E-01
				137	
E9029010A	08	0-2	Cs	241	(+2.6 +/- .23)E-01

Notes: ¹ Activity (T) includes the total uncertainty resulting from the statistical, sample/detector geometry and efficiency. These uncertainties have been propagated in quadrature, expressed as 1 standard deviation.